FEBRUARY 19, 1986 VOLUME 20, NUMBER 7A

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CIRCLE READER SERVICE NUMBER 44

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Second-class postage paid at Framingham, Mass., and additional mailing offices. *Computerworld* (ISSN-0010-4841) is published weekly except January (5 issues), February (5 issues), March (5 issues) April (6 issues), May (5 issues) June (5 issues), August (5 issues) September (7 issues) October (5 issues) November (5 issues) December (5 issues) and a single combined issue the last week in December and the first week in January by CW Communications Inc. Box 880 375 Cochituate Road Framingham, Mass. 01701

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Computerworld subscription prices, $2.00 a copy; U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (airmail service). *Computerworld Focus* price $5.00 a copy. Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35mm microfilm through University Microfilm Int. Periodical Entry Dept. 300 Zebb Rd. Ann Arbor Mich. 48106. *Computerworld* is indexed; write to Circulation Dept. for subscription information.

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POSTMASTER. Send Change of Address to Computerworld Focus Circulation Dept., P.O. Box 1016, Southeastern, PA 19398-9984.

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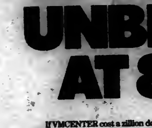

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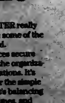

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CIRCLE READER SERVICE NUMBER 99

VIEWPOINT

EDITORIAL

Let's Play Ball!

The software industry is in the middle of some very fundamental structural changes. Recognizing that software is the driving force behind hardware sales, the whole industry is hoping that software sales will pick up — soon.

We will be seeing more buy-outs such as the recent Ameritech acquisition of Applied Data Research, Inc. These buy-outs as well as joint marketing agreements will become commonplace as companies struggle to remain competitive and/or survive.

One of the major structural changes taking place is in software pricing. All parties seem to agree on the inevitability of climbing software prices. But because of the continuing sluggish sales, software vendors, particularly the independents, are still willing to "play ball" with users on their pricing strategies. The end of year 1985 saw a marked increase in price slashing by vendors hoping to make up for slowed sales growth.

The wild card in the deck, of course, is IBM, which is not really a wild card at all. Software continues to be of increasing importance to IBM and because it is the dominant player in many of the software segments, the company has no need to negotiate. In turn, IBM's pricing strategy affects every other software company down-the-line. So directly or indirectly, IBM sets the pricing for most of the customer base.

IBM is expected to continue to raise prices in at least three ways over the near future: periodic upward adjustments, price hikes accompanying releases of enhanced software programs and price increases attributed to different kinds of pricing methods. Consumers are caught in the pricing trap because software is more difficult to cost-justify than hardware purchases and few installations go through a justification process for an enhancement.

The entire software industry is becoming more service-oriented. Instead of relying solely on software sales for revenue, vendors are unbundling services like training, support, documentation and maintenance. In this way, they can charge for the software itself and each of the add-on services can become a profit-and-loss center for the vendor.

But vendors may be beaten at their own game and may never have the chance to institute these increases or new pricing methods. As the slowdown draws on, users are gaining confidence and becoming accustomed to negotiating for software pricing. Some vendors may even find that customers refuse to consider a software vendor that is unwilling to negotiate over price.

Ann Dooley

INSIDER

The Writing On The Wall

By Timothy J. Caffrey

The hardware vendors saw it first. In the late 1970s it became clear that the economies of production that had driven profits for the previous decade were undergoing a dramatic change. Advances in microprocessor design and production foretold a new era. Increased reliance on off-the-shelf components coupled with overseas manufacturing and assembly — most notably in Japan and the Far East — confirmed it. The computer as commodity was born.

The cost of computer power fell dramatically. In response, smart vendors shifted their primary emphasis from hardware to software, networking and service; and the systems solution was born. Less astute vendors are dying a slow death.

In 1985, the software industry showed signs of a change as fundamental as that which confronted hardware vendors. The year was marked by stagnating revenues and an obvious thinning of the ranks. Venture capitalists looked elsewhere. Acquisitions abounded. Industry stalwarts foundered. The less astute wrote it off to a sluggish economy and overabundance of underfinanced ventures. Others see it as part of a rapid reorientation of product and profits in the traditional software marketplace.

Within five years, the software industry will be unrecognizable. The forces behind this industry redefinition have been at work for some time. The most significant are:

- Buyer tolerance is waning. Software is a big, serious business. The costs of training, reconfiguration and redeployment continue to rise. Vendor viability plays an important role in product selection. Because vendors must demonstrate commitment as well as product genius, the price of admission has risen considerably.
- Software sales is no longer a love'em and leave'em proposition. In large and small businesses, products, services, day-to-day operations, profits and performance are increasingly dependent on computer-based systems and software. The marriage of business with business systems means tremendous opportunities for the engineer and analyst who can keep the relationship going.
- Just as the stand-alone business computer is history, so too is the stand-alone software package. Software design must reflect the need to operate in a multivendor, multitiered environment.

Success in the new age requires the following new approaches to the market:

- Embrace site licensing. There is no reason to believe the demand for site licenses will stop at the microcomputer.
- Focus on training and service. Software and service is not an either/or proposition. The amount spent on training, customization, service and support will continue to increase dramatically.
- Build a vertical perspective. The conversion to multitiered, Unix-inspired application environments is under way. Applications like data base management running from micro to mainframe will command greater attention and sales than a mixed bag of integrated horizontal packages.
- The vertical perspective extends to the multivendor system as well. Anticipating and responding to the rapidly changing standards environment is the most vital strategic planning challenge facing software vendors.
- Seek out strategic alliances. Joint development and marketing agreements with hardware, software and service vendors will be lifesaving.

The bottom line: Market distinctions between hardware, software, telecommunications, networking, service, training and support are inaccurate and dangerous. While software design and development will continue to be a solitary art, the software business cannot afford to be.

Caffrey is director, strategies for micros and office systems, for International Data Corp. in Framingham, Mass.

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BLUE BEAT

IBM's Software Strategy: New Directions

By Dale Kutnick

Software will be one of IBM's key revenue growth areas during the next decade While IBM's overall revenues will rise at a 13% to 16% cumulative annual growth rate. software revenues will grow at a steady 32% to 38% rate. As a result, software will grow from about 5% of 1982 revenues to over 8.4% of 1986 revenues (about $5 billion) to 16% of 1990 revenues, to nearly 33% of 1995 revenues (about $60 billion). With these figures. IBM will solidify its role as the industry's dominant software provider

Not only will IBM sell more of its traditional systems software products (with increasingly sophisticated operating systems, subsystems to control more, larger and higher complexity program requirements), but there will be many totally new facilities, applications and enhancements. These will focus on artificial intelligence and expert systems, communications and networking (especially micro-to-mainframe), cooperative processing, management and control, office automation, end-user data base management systems (DBMS) and query facilities, fourth-generation languages and application generators, on-line transaction processing and so on.

It is these software facilities that will help to consume the 600,000 to 750,000 millions of instructions per second (MIPS) that IBM will ship in its large systems during the next four or five years. To support this software explosion, IBM will employ new distribution methods, more private labelling of third-party offerings, more outright sales (vs. monthly fees) and new packaging and bundling techniques.

But even more significant (for large users) mainframe system software prices will continue to increase substantially with each new release — particularly on operating systems and major facilities — by 30% to 60% in many cases. Indeed, large users can expect their software charges to increase by a 25% to 30% annual average during the next five years.

Software plays four major roles in IBM's long-term strategy:

- It is a major revenue and earnings source. Gross margins on software are extremely high because there is little competition to drive prices down. Moreover, systems software is becoming more sophisticated and complex, creating market entry barriers for new vendors. Finally, software development is people-intensive, giving acquired software packages a direct replacement value to users, thus ensuring market growth.
- Software sales are relatively consistent (compared to hardware) because they're being acquired by an installed base that's trying to leverage more value out of their existing systems. This enables software to act as a balance against cyclic hardware sales (like those of the IBM Personal Computer) and hardware price erosions caused by plug-compatible manufacturers.
- Software is a major consumer of hardware resources (DB2, Disoss) so that increased software facilities will eventually lead to additional hardware sales (the more powerful the hardware, the more software can be buried in the machine).
- Users are increasingly being locked into the IBM software environment. Again, this user base enables IBM to target its software development and be assured of a constantly expanding revenue stream.

IBM will increasingly focus its primary attention on the high ground — complex systems; communications and networking; and management/control software, supplemented by sophisticated tools and facilities.

IBM will rely heavily on alliances with third-party software suppliers for more specific or vertical applications packages and utilities and it will increasingly private-label and distribute appropriate products. This will be a mixed blessing for independent software vendors because many of the traditional competitors (such as Cullinet Software, Inc. and Applied Data Research, Inc.) have concentrated on systems software like DBMS (where IBM is currently concentrating resources).

To consolidate its control over systems and facilities software in its environment, IBM is developing not only bridges between its different operating systems but common subsystems and applications. These cross-system products (like SQL, QMF, Displaywrite, GDDM, LU 6.2 and PS/Profs) will be critical for creating common user interfaces. In addition, IBM will bundle parts of major subsystem instructions into operating systems, microcode or special processors to create a higher level user interface and improve performance. (This move could also hurt system software vendors if they're not careful.)

Finally, VM and MVS will become IBM's primary System/370 operating systems; during the next five years, VSE will functionally collapse into MVS, and users will be actively encouraged to migrate (there will be no 31-bit version of VSE, so there will be no virtual storage relief and in addition, new software will simply not run well in this environment).

Kutnick is an independent consultant based in Waylond, Mass., specializing in strotegic planning for IBM users ond competitors. He was formerly executive director of The Yankee Group.

Developing CICS applications on an IBM* mainframe can be a very laborious, painful experience

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CIRCLE READER SERVICE NUMBER 55

ISSUES AND ANSWERS

Trends In Applications Software

By Robert D. Gilges

The proliferation of micros and their application in the work environment has in many cases clouded the issue of where responsibility lies for supporting an organization's computing capability. It has also caused a great deal of emphasis to be placed on hardware and small individualized software packages such as spreadsheets and data bases. In spite of this emphasis on micros, the bulwark of an organization's computing and data resource is still concentrated in larger, more sophisticated software applications running on mainframes and minicomputers. This software is typically supported by MIS departments that were either responsible for developing the application or for selecting, modifying and installing a package or packages.

Organizations have developed a high degree of dependence on applications software to help them remain competitive as their business environments have become increasingly volatile and subject to change. Many organizations have been able to modify their policies and procedures in order to accommodate software application systems. However, for these organizations to stay competitive and responsive, more demands for flexibility and capability in applications software will be required.

Attempts at categorizing the application software environment are, of course, fraught with dangers of oversimplification and overgeneralization. Nevertheless, in order to look at some of the trends that are occurring, some of the following broad groupings are needed and helpful.

- Hardware: Today's hardware environment is multidimensional in that organizational application software is running on various combinations of large mainframes, minis and to a lesser extent micros. Some organizations have equipment from several different vendors, which makes integration of overall organizational information difficult if not impossible. And, of course, most vendors have equipment that is not compatible across product lines. Vendors such as Digital Equipment Corp. and Wang Laboratories, Inc. are making serious attempts at compatibility up and down their own product lines, which can be a great help for planners of applications software.

See ISSUES page 59

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CIRCLE READER SERVICE NUMBER 94

Awareness of Software Maintenance Growing Slowly

Ned Chapin is president of the Software Maintenance Association, a new organization that brings together professionals interested in software maintenance. In addition, Chapin is a data processing consultant with the Menlo Park, Calif.-based Infosci, Inc., a small computer consulting firm specializing in the software area. Chapin shared his thoughts on the importance of software maintenance with Computerworld Focus.

Have you found the need for systems maintenance services growing?

We find that the recognition for software maintenance is growing, but it is very slow. This is really surprising because the main cost of software isn't in producing it the first time but rather in enhancing it, altering it, modifying it, adapting it and correcting it to fit a changing environment and a changing need. You're trying to hit a moving target and producing the software once may hit the target once, but you need to hit it each week, each month, each year thereafter. That means you have to keep doing that software support service.

Ned Chapin

Is your aim to teach data processing professionals within a company to make these modifications and changes and enhancements themselves?

Yes. We feel that the job is best done by those closest to the job. We're there to provide the technology, the means, the knowledge to help build the skills. [A company's own staff] can do it most effectively and especially most cost-effectively. We're in the technology transer business really. That is what the essence of consulting work is.

Are you usually training people on prepackaged software?

More commonly it is on applications they've written themselves at some prior time. They may have been written three years or two years ago or 15 years ago, but now they have this thing sitting around that they need to adapt and modify to fit a changed circumstance or a changed need. They may have gotten a new product line or they may be offering an additional feature. They need to revise their internal production processes, accounting processes and marketing processes as well as their market forecasting to reflect this change in their product mix.

Why don't more companies avail themselves of the most up-to-date techniques?

There are really two reasons. First, they don't realize the target needs to be hit regularly. They tend to think they hit it once and they don't have to worry about it again for a long time. Second, they don't realize there are available tools and techniques. The typical assignment is to fix it so it represents today's reality. But they don't realize it is a specialized ball game in which there are methodologies, tools, resources and intelligence that can be brought to bear to make that easier and particularly more cost-effective in today's environment.

What will make more companies wake up and smell the coffee?

The increased recognition and realization of the fact that software is indeed a commodity that, like coffee aroma, tends to disappear with time and you need to refresh that aroma. When companies hear of other organizations' successes, they then realize that there is another way of doing it. It is word-of-mouth from people who have been there and said, 'Hey, there is a better way.'

Is this better way the aim of the Software Maintenance Association?

One of its objectives is to try to spread the word that software maintenance is indeed a valuable and useful activity. Many organizations often relegate software maintenance to their less experienced people.

The basis of growth is a healthy present existence. You can't grow when you're sick. That's the message of the Software Maintenance Association. We're concerned with promoting the interests of software maintenance, improving its public recognition and disseminating and gathering information about successes and failures in the software maintenance area.

How can people find out more about the Software Maintenance Association?

They can contact me. We need to organize local caucuses, and we need to have someone take the lead in forming these caucuses.

— Lee White

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CIRCLE READER SERVICE NUMBER 87

MANAGER'S CORNER

Simplicity Is The Key To Productivity

By Jim Young

Productivity. To those who manage the software development process it is the watchword, the Holy Grail against which ongoing performance is measured. We are always on the lookout for technologies like personal computers or fourth-generation languages to speed the process of meeting company software needs. However, as strides are being made in some parts of software projects, we are still locked into the Dark Ages in our analytical techniques. In particular, our software development methodologies are as outmoded as the buggy whip. Whether they are handgrown procedures or the commercial variety, they have plenty of catching up to do.

Years ago the design component of a software project constituted at least one-third of the project (and that was in the days when people used to write assembler code). For a typical project today, it is sure to be higher. Add to that the project management overhead plus the documentation and well over half of a project is tied up in areas in which technology is not being applied.

One reason we are in our current fix is due to what used to be important when existing rule books were written. When auditors took a look at what computer systems could do, they insisted on a multitude of controls: testing, signoffs, approval documentation and so on. The complexity started growing; we did not help matters. With a scarcity of experienced project managers available, data processing felt it could reduce the software development process to something akin to paint by numbers. This checklist mentality may be able to lead an inexperienced manager through a design effort, but it can also complicate and limit the efforts of a seasoned project manager.

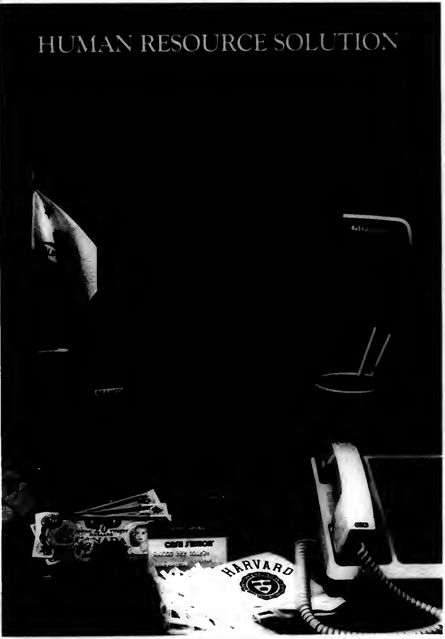
I am not saying these concerns shouldn't be addressed by features in software development methodology. I am suggesting moderation to avoid burdensome and complex project rules. The penalties are more than just low productivity. Onerous rules and inflexible regulations squelch creativity. Moreover they are often not adaptable. When decision support systems were being pioneered, traditional methodologies proved to be too focused on transaction systems to be efficient. Likewise older procedures are not tolerant of make vs. buy evaluations or even inside vs. outside staff assignment evaluations. It is not that awkward methodologies can't accommodate these variations. On the contrary, they have been made increasingly cumbersome and confusing to do so.

What can be done to introduce variety and open the door to productivity? A speed reading instructor once said the key to getting through your reading quickly is to avoid reading extraneous material. The same is true in system design activity. Don't do unnecessary things. Can some procedures be bypassed depending on the size and nature of the work? Is there an evaluation that can be avoided? A form you can do without? An approval that should be optional? Productivity can be best achieved by not doing something rather than doing things more rapidly.

Of course there is no free lunch, and this is no exception. Before making adjustments to your system development methods, note the following issues.

Make sure that as tradeoffs are made, the consequences on

See **MANAGER'S** page 59



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CIRCLE READER SERVICE NUMBER 90

DEC Dominant Supplier Of VAX Systems Software

Digital Equipment Corp. is not only the dominant supplier in the majority of segments of the VAX system software market but, in some cases, the only supplier that has any appreciable share of the market. These are the results of a survey by market research firm Computer Intelligence Corp. (CIC) located in La Jolla, Calif.

A CIC review of system software used at VAX sites indicated 63% of the sites using data base management system (DBMS) products, followed by data dictionary software at 34%, communications control software at 31% and application development systems software at 26%. DEC controls each segment of the system software market except DBMS, where the research firm indicated DEC faces stiff competition from a number of third-party suppliers.

"Though DEC has about 72% of the DBMS market at VAX sites, their offerings tend to be at the low end of the market," a spokesman at CIC explained. "Until DEC comes out with more production-oriented DBMS products, inroads will be made by DBMS suppliers such as Oracle Corp. as well as traditional mainframe DBMS suppliers such as Cincom Systems, Inc.; Software AG Systems, Inc.; and Information Builders, Inc."

CIC added that the continued development of corporate information centers will also affect the development of the VAX-based DBMS market.

"Products like [Mathematica Products Group's] Ramis and [Information Builders, Inc.'s] Focus with their stress on fourth-generation languages are more suited to the information center concept, which emphasizes information production, not just retrieval," CIC said.

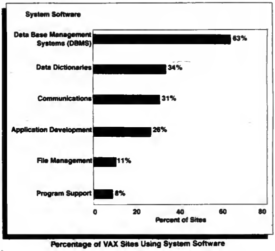
CIC estimated that about 18% of current DEC VAX sites have information centers, but the number is expected to increase significantly with the widespread growth of the center concept.

"In light of this," the CIC spokesman explained, "DEC will have to target more of its DBMS offerings to these centers in order to keep ahead."

CIC also found that the application software market within DEC VAX sites appeared to offer the greatest potential for new entries from software vendors. At these sites, most frequently used application software products ranged from payroll systems (9%) to spreadsheet software (16%), with applications like data analysis, accounts payable/receivable and graphics in between.

"Within the applications arena, a limited number of suppliers are chasing the software dollar," the company said. "This factor combined with the lower key roll that DEC plays presents the opportunity for new product offerings."

CIC concluded that the future of these growing markets depends on the development and level of sophistication of the VAX user base. The introduction of information centers, the increasing power and clustering of VAX systems and the penetration of business markets will all influence software success in these areas.



Percentage of VAX Sites Using System Software

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                                           QUOTA      SALES      %
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                Specialty Furnishings      $ 500.00   $ 851.00   170.20
                Upholstered Office Furn    $1000.00   $ 932.20    93.22
         TOTAL  FOR PATRICIA JACKSON       $2300.00   $3433.74   149.29

         05     JOHN BRIGHT
                Specialty Furnishings      $ 500.00   $1251.00   250.20
                Georgian Home Line         $1500.00   $2532.20   168.81
                Executive Furnishings      $ 800.00   $1216.36   152.04
                Upholstered Office Furn    $1000.00   $ 916.20    91.62
                Colonial Home Line         $1500.00   $    0.00    0.00
         TOTAL  FOR JOHN BRIGHT            $5300.00   $5915.76   111.61
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CIRCLE READER SERVICE NUMBER 37

What Is The Future Of Honeywell's Multics?

Honeywell, Inc.'s Multics users make up for a lack of numbers with a huge dose of enthusiasm. In fact, the computer company was seemingly surprised by the dedication its Multics users have shown to the operating system following Honeywell's recent announcement that it was no longer supporting long-term projects aimed at expanding Multics within its large systems division.

Introduced in 1973, Multics never achieved the kind of widespread user base in the U.S. and Europe that Honeywell orginally envisioned. With only about 60 user firms in place by 1983, the company began considering various options for the operating system.

"At that time, one of our presidents began visiting some major Multics customers. The impression he received was that despite being one of the largest operating systems available, it was also one of the least qualified for multiprocessing environments," according to Karl Laubscher, director of Multics marketing at the Honeywell Office Management Systems Division, located in Billerica, Mass.

Laubscher said that in early 1984, responsibility for Multics was shifted from Honeywell's Large Computer Products Division in Phoenix to its Office Management Systems Division in Billerica. This move foreshadowed the eventual cancellation in April 1985 of an internal Honeywell project named Flower, which would have produced a large systems version for Multics, with more hardware capacity than the DPS 870M, Honeywell's current high-end Multics processor.

"Our pilot projects clearly showed that the refocus to a new large system would have taken more money than we had first thought," Laubscher explained. "The Multics user base just wasn't there to justify it."

Karl Laubscher

In Joly 1985 a letter was sent to Multics customers explaining that Honeywell had decided it could no longer invest strongly in Multics. The gist of the letter made clear that the company thought building a large hardware system around Multics was cost-prohibitive. It also promised that current Multics customers would be provided for by the scheduled 1986 introduction of Multics Release 12. This will be an enhanced version combined with the phasing-in of more Unix-like multiprocessing features in 1987.

As this was occurring, members of Honeywell's Large System Users Association (HLSUA) were petitioning Honeywell to consider three alternatives: build the Flower processor, port Multics to some other company's 32-bit hardware line or sell the operating system to a third party that could supply additional hardware.

Laubscher said Honeywell considered the options before making its statement about the new Multics release. Again, Honeywell decided it could not cost-justify the first two options. It also decided that making money from the third option would require generating a substantial new user base, something that seemed unlikely given Multics' sales track record.

In January, HLSUA was given the decisive word about Multics. The DPS 870M will be manufactured until 1988. The new releases of Multics will go through in 1986 and 1987.

Honeywell had something more to offer. The company also declared that it would soon begin migrating core features of Multics to smaller Honeywell 32-bit systems under production over the next two years. These systems are part of Honeywell's strategy of increasing its presence in office automation, bringing Multics into the same arena.

"By that time," Laubscher concluded, "the smaller systems will pack more processing power than the company's present large systems."

Will that keep Multics users happy? "I hope so," Laubscher said. "I think many are skeptical it can be pulled off smoothly."

See **NEWS** page 60

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3317-0526

TECHNOLOGY INSIGHT

Can One Size Fit All?

JON MCINTOSH

·BY·DOUGLAS·B.·CRAWFORD·

The word 'relational' is overused, abused and misused. Theory must be separated from reality and hype from fact. To wade through the mire of relational technology — its definitions and offerings — some clarification is in order.

Relational. Sounds simple and innocuous, doesn't it? But mention the word in a room full of MIS executives — or better yet, executives from a relational software vendor — and the result resembles a combination of the kid's game of telephone and shouting fire in a crowded theater. The telephone game comes to mind because everyone has a different definition for the term, some accurate, some partially accurate and some merely convenient. Yelling fire seems appropriate because of the pandemonium the word relational creates among opposing camps. The most recent example is the verbal slugfest between Edgar Codd, founding father of relational theory, and John Cullinane, chairman of Cullinet Software, Inc. (vendor of IDMS/R), following Codd's two-part *Computerworld* article describing the criteria for relational systems.

Why all the uproar and confusion? There are a number of reasons. One is that the industry is always looking for buzzwords. The problem with buzzwords is that their true meaning and potential import varies inversely with usage. Certain terms — fourth-generation language, for instance — are perfect buzzwords because they are nebulous to begin with; that is, they have so little substance they are easily manipulated to fit the circumstance. Other words — relational is one — present more problems because they serve as both sign and symbol. As a sign, they have certain distinct, irrefutable properties. As a symbol they represent a better way, the primary characteristic being that it is not the old way.

Another source of confusion is that in using relational as a buzzword, people tend to reduce it to its lowest common denominator. Thus, any system that supports tabular views of data is considered relational or, to be even more vague, relational-like. Does this mean that a CMS file is relational? Hardly, but some people might try to convince you that is the case.

Adding further to the general chaos is that even the purest of the currently available relational systems support only some of Codd's 12 criteria for relational systems, thus setting up a dichotomy between theory and reality, which leaves room for further exploitation and misinterpretation. And because we don't yet have what Codd would term a fully relational system, it is hard to realize truly the potential advantages and uses of relational vs. other implementations, just as it would have been hard to predict the uses and effects of television upon society prior to television itself.

In order to assess the impact of relational technology accurately, we must separate hype from legitimate expectation. With this in mind, let's look at some of the notions currently associated with the relational concept.

Relational is the next big thing. Absolutely true, but what does that mean?

Structured Query Language (SQL) data tables are anticipated to become a de facto storage standard over the next decade regardless of the current misgivings concerning performance and lack of application tools. IBM will put much effort into narrowing the IMS/DB2 performance gap, and virtually every existing vendor of productivity software will move to implement an SQL interface. In addition, we should see an increase in third-party software offerings designed specifically to work with and enhance DB2/SQL/DS products from IBM.

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TECHNOLOGY INSIGHT

The current debate over IBM's implementation of relational technology — it's not fast enough, it doesn't do enough and so on — is strikingly similar to the criticism the IBM Personal Computer initially received. So what? IBM products, especially software, have rarely been acclaimed and purchased because they represented the state of the art, but they have been purchased in enormous quantities and will continue to be. When the dust settles, IBM will likely have achieved much the same kind of market penetration with the DB2, SQL/DS and QMF product set as they did with the PC, and aiding that will be a whole market developed to provide add-on capabilities.

Relational will solve our problems and provide easy solutions. Nonsense. If anything, a concerted move to embrace relational methodologies will increase awareness of just how inadequate current practices are. First and foremost will be the realization of the strategic importance of data dictionary technology and data administration practices — neither of which has any intrinsic relationship to relational methodology. Right now dictionary technology is woefully limited, and the extent to which data modeling and administration have been embraced and enforced is quite small.

While there has been a coincident increase in attention paid to both relational technology and data administration, there are still a number of significant problems in both areas. In particular, the dictionary capabilities of relational systems need to be greatly improved. While the ability to handle dictionary-type data in tables just like other data is potentially powerful and useful, there are still too many limits on the attributes you can currently store in relational dictionaries.

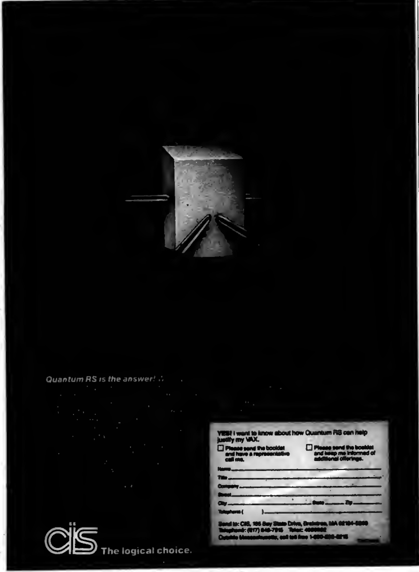
One of the most critical improvements necessary is implementation of the domain concept. As defined by Codd, domains consist of the whole set of legal values that can occur in a column. Domains represent a higher level of abstraction than the column (many columns can be defined within a given domain), and are thus capable of representing more complex relationships as well as simplifying administrative tasks. Another critical requirement is that of referential integrity and view updating. Referential integrity in its simplest form means that if an employee is deleted from the master file called employee, all related records from files such as salary history and job history are deleted as well. View updating allows update operations to be performed on logical tables (views) as though they were physical tables. This capability provides enormous flexibility in application design as well as ad hoc usage.

In short, relational systems must support full dictionary features capable of modeling a complex corporate environment and be able to handle all necessary operations on data as automatically as possible.

One real hope offered by relational systems is that they may promote a greater degree of standardization and portability among data and applications. Oracle Corp.'s Oracle, for example, already offers SQL compatibility in a product available in IBM, Digital Equipment Corp., Honeywell, Inc. and other personal computer environments.

Another plus is the simplicity and power of SQL. Even if used in conjunction with a lower-level programming language like Cobol, applications take less time to code with SQL than VSAM or its equivalent. SQL syntax is very simple (less than 10 basic commands); it can be embedded without modification into programs and requires no explicit traversal of a data base structure as with IMS. Furthermore, with capabilities such as the subquery, complex operations can be performed using a minimum of code.

People will probably point to the fact that DB2 does much of the work of data access behind the scenes and view this characteristic as the inability to fine-tune the system. DB2 does perform much work behind the scenes and, from what I understand, it does not always choose the best access path. Drawbacks of this sort are to be expected in a new product. In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time, they can be corrected, and the net productivity increase should be significant. Even now, such drawbacks affect only a minority of applications while productivity gained from faster development and simpler maintenance applies to a majority of applications.

In short, while relational systems provide an easier (although not necessarily easy) and more flexible method of storing, manipulating and accessing data, such advantages only serve to highlight current problems with actually managing the data itself. Hopefully, we can benefit from this recognition, in that it will force us to address the larger issue of data administration.

The argument of dual data base vs. integrated data base supposedly centers around the desirability of having one system for all aspects of data management activities vs. having one system for critical transaction processing activities and another for general end-user/information access type activities. This controversy is silly and largely irrelevant within the context of current corporate policies and environments.

For example, Cullinet Software would not be a $100 million-plus company if people who already have IMS didn't go out and buy IDMS as well. It's a good bet that of every 10 IDMS installations, perhaps half have IMS as well. Talk about dual data bases. And of those having both, probably very few have spent the time and effort necessary to convert their IMS applications to IDMS.

In fact, among the 35 companies that comprise our Decision Support Center (DSC) association, the existence of multiple data base management systems (DBMS) is more the rule than the exception. While this fact pertains more to so-called fourth-generation software (Focus, AS, Ramis II, Nomad2 and so on), there are still many instances of multiple large-scale DBMS in the same environment. In fact, as corporations become larger and more diversified (supposedly increasing the need for and utility of an integrated system), the greater the likelihood of their having multiple DBMS systems of all kinds.

Another problem with the dual data base controversy is that while the theoretical elegance of the integrated approach is hard to dispute, I have my doubts as to the ability of DBMS vendors to meet the needs of end users with existing attempts at product retrofits and upgrades. Evidence of this can be seen in Cullinet Software's struggle to penetrate the user market with Goldengate and ASF.

While products such as ASF are quite useful when viewed from the perspective of corporate data processing's relationship to end users, they are not at all competitive with information center products like Focus, Nomad2 or AS. They are not as easy to use, and they don't do as much.

My biggest objection to this controversy is that it attempts to ignore a significantly new technology in order to protect existing turf. While this is understandable, it is not beneficial. Many of the arguments against relational systems are based solely on what might be called seniority: that is, because other systems (network, hierarchical) were here before, it is sacrilegious to try to disturb them. You get the feeling that if relational technology existed prior to the industry standard-setting group Conference on Data System Languages (CODASYL) standard, we might not be arguing at all.

You must question whether trying to tack relational capabilities on to IMS would have been a better solution than to offer DB2 separately. I doubt it. Would integrated proponents have philosophical objections to an IMS/R? I think that IBM simply decided that relational technology was too important not to pursue correctly, and that meant doing it separately.

I would tend to agree with the integrated position more if I didn't think that relational technology was a significant new step in data management capabilities. If the major drawback to DB2 is that it is not as fast as IMS or IDMS on a transaction basis, I'm confident that this is a small and probably temporary price to pay for the advantages it offers.

XEROX

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I certainly would be tempted to choose a real relational system over (or in addition to) a combination CODASYL/pseudo-relational (IDMS/R) or hierarchical (IMS) system even if it meant having two systems concurrently. After all, the original IMS or IDMS applications aren't going to just go away. We all know that it is virtually impossible to displace or convert an established base of applications and users. Instead, what is going to happen is that IMS or IDMS will be used where appropriate, and DB2 will be used for newer applications, with virtually every system on the block having to write an interface to DB2 to get data in or out.

It is also pertinent that most of the uproar concerning relational systems started only after it became clear that IBM would release a commercial version of the System R relational project. Most of the current combatants brought relational enhancements to market coincident with or shortly after the debut of IBM's SQL/DS environment several years ago. Many earlier products, particularly in the DEC world, supported either advanced relational (Oracle and Relational Technology, Inc.'s Ingres) or at least tabular file orientation and limited relational-like multitable joins and projects (National Information Systems' DPL and Accent-R) long before the battle heated up to its present pitch. Still, no one paid much attention until IBM joined the fray and lent credibility to the relational concept.

I get the feeling that if someone promised to solve our data management problems by prescribing the blood of two spotted toads we would gladly take the medicine. (We are in so deep and we're so desperate that we'll try anthing, but unfortunately there is no quick fix.)

It doesn't matter whether you choose IDMS/R or DB2 or Focus or SDL/DS — or even all of them together — if you don't have the resources, backing and commitment to recognize and begin to address the larger issues of data administration simultaneously. Beyond that, there is what we call the data warehouse or repository: a facility to gather, manage and make corporate, departmental and personal data accessible to users.

Of the current crop of systems, it's unclear which represents the best approach: IDMS/R and ADR both have a seductive overall strategy, and IBM offers a system that is elegant in its seeming simplicity. Yet a big problem remains in dealing with all the systems and structures and the attendant inertia that already exists within corporations. Even disregarding large DBMS systems such as IMS and IDMS as well as myriad files managed with Cobol or PL/1, we have witnessed a tremendous proliferation of so-called fourth-generation and decision support systems over the last decade. So much so that examples like the one mentioned earlier are not at all uncommon. People must be able to make the best use of what they have already available to them. They are challenged to fit existing components into some strategy suitable to contemporary needs.

One of our company's current efforts in this area involves benchmarking systems like Focus, Ramis, Nomad, AS and SQL to find out where they start to break down in their ability to handle increasing volumes of data in a relatively unstructured, nonstatic application environment.

> ”
>
> *If someone could solve our data management problems by prescribing the blood of two spotted toads we would gladly take the medicine.*

Concurrently we are using the same set of problems to evaluate the style and true ease of use of larger systems such as IDMS/R and Datacom/DB, which are now attempting to penetrate the end-user market.

We feel that the grand scheme of integration has the potential for collapsing under its own weight, and we also wonder how far DB2 and SQL/DS actually go toward solving the problems facing corporate MIS today. By attacking such problems concretely and on a small scale within the context of providing data warehouse capabilities, we hope to start compiling a body of information useful in planning for future applications and for managing existing systems. A few words on the subject come from a contact who after doing exhaustive performance benchmarks on DB2, MODEL 204 and a relational data base machine (involving weeks of dedicated 3081 CPU time, multigigabyte files and completely inconclusive results), said: "There ain't any one solution. It's a lot of little pieces put in place one step at a time."

All new technologies take some time to shake out the major bugs. The hope is that relational systems will provide a superior tool to address the long, difficult process of organizing, managing and disseminating corporate data. ▣

Crawford is director of data management services at Real Decision Corp., a research and consulting firm in Darien, Conn.

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CIRCLE READER SERVICE NUMBER 81

PRODUCTIVITY TOOLS

Working In Harmony

• BY • STAN • KOLODZIEJ •

Can end users and MIS create programming music together at computer keyboards? Anything's possible. Vendors of emerging micro-based application development systems are hoping to bring new harmony to the entire process of program development.

With budget cutbacks now finding their way into MIS/data processing departments, application generators for microcomputers are being watched as serious tools to speed and increase programmer output.

Unlike scores of available mainframe application generators, most micro-based generators stress the importance of the user interface up front in the crucial application design and prototyping stages. By increasing user involvement in the design phase, vendors of micro-based application generators claim the finished, coded program will be much cleaner, requiring far less maintenance than many mainframe application generators.

"Our customers have shown us that nearly 60% of the cost to implement an application is in the design stage," according to Bill Martin, president of Cincinnati-based Tominy, Inc., producer of an application generator called Mach I.

Application generators do not stress design speed as much as design accuracy. By sitting at a user's microcomputer, a casual design atmosphere can be formed involving data processing analyst and user. Both can create and revise a program on a screen, sometimes in a matter of hours. A generator's built-in screen generation and screen flow abilities can direct both parties through a new application without disruptive breaks. Such immediacy can often provide a better sense of what the user wants.

At each stage of application development, many generator systems can capture and produce concise documentation automatically, a more difficult chore when handled manually.

"Before we started using [Cambridge, Mass.-based Index Technology Corp.'s] Excelerator," Ernie Lysen, systems analyst at Pacific Northwest Bell Telephone Co., Bellevue, Wash., explained, "we put user requirements on paper. As we went into the definition stage, we would have to retype or redo everything from one format to another. Now requirements go automatically into the application generator, onto a hard disk and are immediately available to the coder, the designer, whoever wants to see and modify it. What we have is maintainable documentation."

Lysen and his colleagues at Pacific Northwest are in the first stages of redesigning the payroll system at U.S. West (a cooperative venture among Pacific Northwest, Northwestern Bell Telephone Co. and Mountain Bell Telephone Co.) using Excelerator, a micro application generator.

During the design cycle, micro-based application generators can create files or data bases and interact with a data dictionary to give substance to screen flowcharting. Included in the system are usually a number of utilities for generating reports and querying the data base as well as on-line editing and testing facilities for taking applications through their final design stages before being coded or compiled.

Steven Stamps, vice-president of research and development at Kenney Technologies, Inc., N.Y., gave an idea of how applications are generated at his company using AT&T 3B2 Model 400 computers and the Accell application generator from Unify Corp., Lake Oswego, Ore.

"We sit down with users and with pencil and paper try and define what it is that they want in an application." Stamps explained. "It's easy to throw up some dummy menus on an AT&T micro and, using the built-in fourth-generation language, throw some logic in to structure the sequence of menus and screens. We can go back to the users and give a narrative or walk-through of how we would get the applications working, showing the screens and the fields and how we anticipate some of the actions on the screen."

Many micro-based application generators include a type of fourth-generation language used to do the actual coding of the programs. By integrating fourth-generation languages with the design phase, application generators can become complete system tool kits supporting every facet of an application cycle: design, coding, testing and maintenance.

The heavy emphasis on design with most application generators usually trades speed for accuracy, which vendors say will more than pay for itself by keeping system maintenance to a minimum. Fourth-generation, nonprocedural languages, however, are built for speed. At the slow coding stage of an application, such languages can save time by permitting programmers, through a sort of fill-in-the-blank approach, to specify what the application is intended to do without having to understand how the application will perform the function. In essence, these fourth-generation languages offer automatic facilities that do away with much of the repetitive coding associated with older languages such as Cobol and PL/1.

Tominy's Mach 1 is one example of a full-blown micro-based generator. Mach 1 runs on a variety of microcomputers including IBM Personal Computers and compatibles as well as multiuser micros running Unix. According to Dale Potter, Tominy's executive vice-president, an analyst can break into Mach 1's Logic fourth-generation language facility at any time during the design stage and do on-screen coding and editing with the user. While such a facility can speed the design cycle, Potter also claimed that every line of code written with Logic is equivalent to six to 10 lines of similar code written with Cobol or other third-generation languages.

"If I want to read a data base file with a program written in Cobol," he explained, "I would have to go through a specific set of parameters to read a record or a series of fields in a data base record. I would have to identify a file that I would want to read, the key or sequence in which I want to look at a record in that file and the proper area I want that information placed after I do the search.

"Using Logic, we can put those parameters together automatically. About 35% of most applications involve what we call maintenance coding: the reads, writes, and inquiries. Mach 1 does that automatically."

Gerry Mawson, a partner in the Toronto financial firm of Woods Gordon, has been using Mach 1 to design and compile a series of accounting systems for business clients. Applications are designed and compiled on IBM System/36s and executable versions are then transferred to clients' PCs and other microcomputers. "By being able to prototype," Mawson explained, "we're probably saving in the order of 30% to 50% in elapsed time in the design stage, especially if we can get away with not producing thick volumes of specifications."

Not all products that vendors tout as application generators carry through every phase of an application life cycle. Many provide parts of the cnmplete puzzle. Excelerator, for example, takes the cycle to the coding stage where the design prototype can be compiled in either a third- or fourth-generation language. Chris Grejtak, Index Technology's vice-president of research and marketing, explained, "There are times when fourth-generation languages are more appropriate than Cobol, PL/1 and Ada, but there is also a huge base of programmers whose expertise lies in the traditional languages. I don't think they should be locked into anything proprietary."

Yourdon, Inc., a New York City firm with an application generator called the Analyst Toolkit, provides separate components of the life cycle that can be run on microcomputers and integrated with a user's existing mainframe software and processing environment.

"As we see it," explained Paul Radding, president of Yourdon Software Engineering Co., a subsidiary of Yourdon, Inc., "there are a lot of companies that have spent millions on hardware and software tools for programmers, and they have systems that are going to take five, 10 or 15 years to go away. They're not going to change things overnight. Instead of trying to provide the same facilities all over again on micro-level machines, we interface with the existing environment. I don't think it's worth trying to reinvent the wheel."

Both Grejtak and Radding might have a good point. One of the primary reasons Pacific Northwest's Lysen chose Excelerator was because it still allowed the designed programs to be compiled in Cobol, his company still being a Cobol shop. Although Mawson at Woods Gordon had praise for Mach 1, he cautioned that much of the productivity gains resulted from his experienced programmers. Mawson added that most of their actual programming is done with Tominy's older Database Plus, a language carrying more of a third-generation procedural approach than Tominy's Logic language.

The market for micro-based application generators is still only about a year old, and it is yet unclear as to what kind of resistance they will encounter from entrenched, third-generation DP shops.

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BENEFITS OF STRUCTURING

Source: T. Capers Jones	Unstructured	Completely Structured
Original program size (lines)	50,000	50,000
New code added (lines)	3,000	3,000
Programmer time (months)	12.5	6.5
Total cost	$75,000	$39,000
Defects at delivery	38	4
Stabilization period (weeks)	21	2
Meantime to failure (hours)	1.5	28

The benefits of structuring are illustrated in this example, representing the costs of adding 3000 lines of new code to an unstructured program of 50,000 lines, as compared to adding the same number of lines to the same size structured program.

Apart from the annoyance of changing old work habits, the use of a proprietary fourth-generation language in many application generators could isolate those products from programmers who fear acquiring an expertise in the language could restrict career opportunities.

Another line of resistance could form around MIS/data processing managers reluctant to introduce new application generators at a time when application backlogs are up to two years in many major U.S. corporations. Managers could argue that generators might push backlogs even further back before programmers become adept in the new systems.

Vendors of application generators, however, are hoping against this, putting faith in the belief that productivity will win out over any resistance. They are betting there will be enough enlightened MIS managers who think that the promise of less maintenance and debugging that the generators offer will more than make up for any short-term disruptions to machine use and personnel.

Vendors will also be under pressure to make good their promises on increased efficiency. Despite some vendors' claims that fourth-generation languages can increase programmer productivity by as much as tenfold, most experts think the figure is a more sobering 10% edge.

Finally, there is a well-cultivated mystique associated with programming that some might think would be threatened by those application generators marketed as also being usable by non-programmers."We did some focus group research with about 30 Fortune 1000 companies," Leigh Anderson, product manager at Unify Corp., explained, "and some of those present commented that with a product like this [Accell], they could hire people with business skills and train them to be systems developers."

Some researchers are skeptical that the stand-alone application generation market can survive at the microcomputer level alone. At the low end, application generators form a confusing mix with program generators, report writers, query languages and relational data base products such as the UseIT series from Martin Marietta Data Systems. Most of these products, however, focus on providing single-user applications and lack the extensive design and prototyping abilities of full-blown application generators.

"There is warfare going on out there at the PC level," explained Paul Cubbage, senior industry analyst with Dataquest, Inc., a San Jose, Calif., market research firm. "People have finally come to understand that the most important application decision is the data base they're using, followed by what tools they're going to use on it."

Cubbage sees the low end, stand-alone application generator market stagnating at $2 million in 1985 and reaching no more than $3 million in 1989. He is much more hopeful for those systems that are portable from the microcomputer level through the minicomputer and the mainframe levels, such as Accell, Excelerator, Mach 1, Analyst Toolkit and Application Builder from Online/Database Software, Inc. of New York City.

Cubbage predicts the market for such powerful, portable systems to reach $150 million in 1989 from a 1985 figure of $70 million. "The applications developed with these systems have far more implications to corporations," Cubbage said, "and produce a richer kind of programming environment." They also carry richer price tags, generally ranging from $3,500 to $6,000 and up.

Vendors have been quick to realize that portability is becoming a strong selling point. Being able to apply their products across a broad range of computer sizes, makes and operating systems will be an important factor in selling those MIS/data processing managers who have witnessed a growing range of computer brands installed across their corporate departments during the distributed processing trend of past years.

"If you're running a program produced by Excelerator in a [Digital Equipment Corp.] VAX environment under VMS," Grejtak explained, "the design is still cogent for an IBM environment as much as it is for DEC. Many of the things we generate, such as data records and screen maps, can be shipped over to any number of different environments. It's more the language it's written in than anything else."

Potter said applications generated with Mach 1's Logic language are portable at the object level and don't have to be recompiled.

Portability was one of the big selling points with Stamps at Kenney Technologies and Mawson at Woods Gordon. "Accell allows a Macintosh-type of windowing interface to a Unix end user using standard ASCII terminals," Stamps explained. "There are still hardware-specific solutions within the Unix environment that tie code and applications to that specific hardware. I think that's going against the spirit of Unix, which is portability across hardware architectures."

Overall, the selling job will probably not end with the portability factor or any of the many other benefits application generators offer. While a lot of hyperbole is being splashed onto the market, users are quick to point out that application generators are perhaps not complete cure-alls as often advertised.

"There isn't any magic in this field," Mawson concluded. "You still have to specify what the job is, understand it in detail and you still have to program it. That part will never change." F

Kolodziej is a senior writer at Computerworld Focus.

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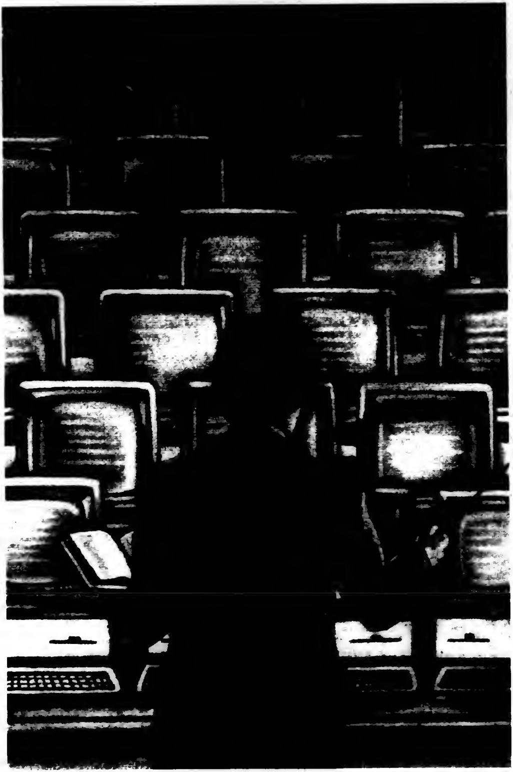

RALPH MASIELLO

Understanding Expert System Shells

• BY • DANIEL • R. • PFAU • & • BARRY • A. • ZACK •

The field of expert systems has moved from the academic laboratory into the business world during the past several years. The expectations for this branch of artificial intelligence are high, and many companies are now exploring opportunities to utilize expert systems in their businesses. At present, this type of computer system tends to be large, complex, costly and difficult to build. Yet commercially available software tools, or shells, have existed for several years, which can make the development of expert systems more manageable. And the number of these tools is growing.

Expert system builders are now asking: What are shells? What different types are available? How are they useful? How do I select one? What are the trends in the marketplace?

Expert systems are computer systems encoded with human knowledge and expertise that solve problems at an expert level of performance in a specific problem area or domain. A typical expert system consists of the following five parts:

- The knowledge base that contains domain-specific knowledge including data, facts and heuristics (rules of thumb).
- The inference engine that is the reasoning process. It draws conclusions and solves problems by applying the knowledge in the knowledge base to a specific problem.
- Development and maintenance aids that are utilities and tools needed to develop, test and maintain the expert system. These utilities and tools generally include: editors that allow users to enter and change the knowledge base; file system software used to store and retrieve the knowledge base; and debuggers and explanation facilities used to trace the reasoning process during a problem solving session.
- Operational system components that are any additional subsystems needed to support an expert system in general use. They include data entry, report generation, communications or word processing subsystems.
- The interface that provides the facilities for developers and users to communicate with the expert system components.

There are many types of expert system shells on the market today. Several of the following primary characteristics can be used to distinguish different shells.

■ Knowledge representation: This refers to the means of encoding the contents of the knowledge base. Two of the common representations provided by commercial shells are production rules and frames. Production rules (or just rules) are individual pieces of knowledge expressed in an if-then format such as: If the client's taxable income is greater than $60,000 and the client has taken all the standard deductions and the client is not averse to risk, then the client should invest in tax-incentive partnerships.

Frames (also known as objects, schemas or classes) are collections of facts representing a person, place, thing or concept and can be related to each other to model the domain. For example, a frame representing a tax-incentive partnership might say: Tax-incentive partnership is a type of investment, generates taxable income loss, is purchased in $5,000 units.

The expert system shells on the market differ in the number and type of representations they provide.

■ Reasoning mechanisms: Several have been developed and may be provided by the inference engine component of the shells. Two of the more common reasoning mechanisms are called forward chaining and backward chaining. Forward chaining (also called data-driven) reasons from initial data or facts to a solution, while in backward chaining (also called goal-directed) the system starts at a goal and works backward to find evidence to support that goal. Expert system shells differ in the number and type of inference mechanisms they provide.

■ Supported hardware: Four major types are:

- Personal computers (standard microcomputers such as the IBM Personal Computer and the Apple Computer, Inc. Macintosh).
- List processing (LISP) machines (specialized artifical intelligence hardware available from vendors such as Symbolics, Inc. and Xerox Corp.).
- Conventional minicomputers (traditional mini and superminicomputers such as Digital Equipment Corp.'s VAX-11 and Microvax).
- Conventional mainframes (traditional, large, multiuser machines found in centralized information system departments).

Some shells are available on more than one type of hardware.

■ Open or closed architecture: Closed architecture systems prohibit the expert system developer from customizing or adding functionality to the shell, while in open architecture systems, the developer can customize or add functionality.

■ Secondary characteristics: Finally, there are a number of important secondary characteristics distinguishing the shells such as:

- Auxiliary features — Different expert system shells with the same general knowledge representation and inferencing mechanisms may provide different auxiliary features. For example, in production rule systems, certainty factors indicating the strength of belief the expert has in the facts and rules may or may not be available.
- Knowledge-base compilers — Expert systems generally keep their knowledge base in an interpretable form. For efficiency of execution, some systems, instead, compile their knowledge bases or provide a separate compilation capability.
- Availability of run-time-only environment — Some expert system shells come with a run-time environment that differs from the development environment. This improves the efficiency of the expert system during operational use.
- Ability to save cases — Expert systems are usually built and

tested by operating them on a set of cases until the system can correctly solve them. Some shells provide facilities to save and retrieve cases so they can be easily retested when the knowledge-base is modified.

- Built-in explanation facility — Some shells allow the user to ask the system why it asked an on-line question or arrived at a particular conclusion.

The use of expert system shells is analogous to the use of a data base management system (DBMS). A DBMS does not provide a data base analyst with a data base design or the data to populate the data base. Rather, the DBMS provides the necessary environment and tools for implementing a data base structure. The analyst must create a logical model of the data base, develop a physical design using the data base mechanisms provided (for example, relational or hierarchical) and implement the design by specifying the records, fields and relationships between the fields to a data dictionary.

You can determine the usefulness of a shell by evaluating how well it can help meet your system development objectives. The following four types of systems meet different development objectives:

- Proof-of-Concept — These systems are developed to test general feasibility of applying expert system technology to a particular business problem. These are very small systems, usually with 50 to 100 rules or the equivalent in a nonrule-based system, that demonstrate overall feasibility but don't provide answers to deeper functional or knowledge-based issues.

- Function-oriented prototype — The objective of a prototype is to explore and provide answers to issues relevent to the eventual operational system. Usually only part of the problem is addressed and only a partial knowledge base is developed. The resultant system only provides the capability to demonstrate the application of expert systems to the problem domain.

A function-oriented prototype is built to determine how the use of an expert system will fit into the business environment surrounding the domain problem. In this context, the prototype is built to test the user interface and possibly other nonexpert components of the system. Relatively little effort is put into developing the knowledge base.

- Knowledge-oriented prototype — This prototype explores the knowledge representation and problem-solving characteristics of the domain. The emphasis is on exploring the development of the knowledge base and inferencing mechanisms. Relatively little or no effort is put into the user interface and other operational components.

- Operational system — The purpose of the operational system development is to solve a business problem and provide benefits to the users of the system. In such a system all components must be complete and usable in the field (tested and documented).

How do you select the right shell to support your development effort? Here's a four-step process.

- First, determine which approach is **appropriate to solving the problem by studying the problem's characteristics.**

- **Second, compare the solution requirements to the capabilities of the** shells to identify those shells that can support the chosen approach. Which tools provide the proper knowledge representations and reasoning mechanisms? Do they run on the appropriate hardware? Is the architecture open as needed? This process will allow you to narrow the alternatives to a small set that appears capable of solving the problem.

- Third, compare the characteristics of these shells against the requirements dictated by the objectives of the prototype. Is it an operational system requiring a robust user interface? Is it a proof-of-concept system, indicating the need for fast development speed (explanation facility) and no need for a run-time environment or knowledge-base compiler?

- Finally, compare the shells for a number of characteristics such as vendor support and training, references, price and documentation.

We foresee a number of different trends occurring in the shell marketplace over the next several years. Many of the LISP machine shells will become available on conventional hardware, including increasingly powerful personal computers. S.1, now written in C, is already available on the IBM Personal Computer AT. Shells will become more powerful, providing not just multiple knowledge representations and reasoning mechanisms, but new and more powerful ones. Some shells will also contain embedded knowledge about a particular problem domain. In addition, shells will become more useful for operational systems, in part through direct interfaces with mainframe data bases and conventional software systems. Finally, shell prices will come down as market pressures and competition increase.

But you don't need to wait to get started. By comparing the features of the expert system shells currently in the market, you can select an appropriate one to support your expert system development activities. ◼

Pfau is principal with Index Systems, Inc., a Cambridge, Mass., management consulting firm that helps companies achieve business success through the use of information technology.

Zack is manager, Consulting Services, for Applied Expert Systems, Inc., Cambridge, Mass., a leading developer of computer-based expert systems technology for the financial services industry.

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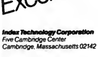

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CIRCLE READER SERVICE NUMBER 36

GEOFF O CONNELL

A verbal agreement isn't worth the paper it's written on

Negotiating Computer Contracts

·BY·MARGE·YONDA·

When negotiating for the purchase of data processing systems and software, some things are negotiable and some aren't. This depends on what you're buying, who you're buying it from, how much you intend to spend and even what part of the world you're in when you're buying it. There are more exceptions than there are rules, and each segment of the market requires a different approach depending on whether you are negotiating for a microcomputer, minicomputer turnkey system, mainframe, software package or custom programming service.

For the purchase of a simple, inexpensive microcomputer product there is usually not a negotiable contract. A $6,000 purchase doesn't warrant a consultant's expertise and legal fees. Microcomputer purchases are usually consummated by the signing of a standard purchase agreement.

For large mainframe computer purchases, contracts and negotiations are lengthy and heavy. The best leverage usually lies with the biggest spender.

Contracts for custom software development and other programming services in which intangibles are being purchased require yet another set of rules different from those involving hardware or packaged software.

Multiuser, supermicro and minicomputer systems are an area in which the dollar investment is large enough to warrant some level of protection from the purchaser's standpoint and in which most purchase contracts are specifically designed to cover the seller with no thought to the purchaser's needs and rights. Within the minicomputer, you must learn the following unspoken rules:

- Major manufacturers like IBM will generally not negotiate contract terms for mimicomputer systems. You must sign what you see in print. And make sure you fully understand the usual contract clause that reads something like this one taken from an IBM agreement: "... the customer agrees that this is the complete and exclusive statement of the agreement between the parties, which supersedes all proposals or prior agreement, oral or written, and all other communications between the parties relating to the subject matter of this agreement."
- Independent turnkey system vendors that purchase hardware from major manufacturers add their own proprietary software and resell the composite system to the end user complete with training and support. These vendors will generally be open-minded about some degree of contract and price negotiations. So will independent software houses. The degree, of course, varies.
- Ask!

The number one pitfall in the vendor's contract is, as stated above in the IBM example, that it may categorically state that nothing that transpired during the selling cycle counts now, in this final agreement, and the contract denies the existence or reliability of anything the saleperson presented, written or oral.

The second pitfall is that, in most cases, full payment takes place when the software is delivered, installed on the hardware and demonstrated using test data. No money may be withheld until the user has processed live data through a defined accounting cycle.

Another pitfall is that when a buyer is sold a computer system, there is a big difference between what he hopes to get and what the vendor is contractually bound to supply. The difference is usually the unrecognized responsibility that the user has unwittingly taken upon himself. Caveat emptor — let the buyer beware — applies here.

And last, if the supplier of software goes out of business, you may be out of luck. The usual escrow agreement that provides for software updating isn't enough.

There are as many pitfalls as there are possible protection clauses. I have 50 to 100 clauses that I have incorporated into contracts to provide maximum protection in the event that all that glittered was not gold.

There are some preliminary steps you can take to negotiate a good contract. The first step occurs when you initially make the decision to computerize. From then on, you should do everything with the ultimate contract in mind.

Preselection preparation must begin with an in-depth, detailed needs evaluation at the most basic level. This detailed specifications document is the foundation for the successful acquisition of any computer system. It becomes the basis for a written Request For Proposal document that will be mailed to suitable suppliers. The Request For Proposal will provide the supplier with the information needed to propose the correct system to meet your objectives and handle your particular business needs.

A detailed needs analysis and a Request For Proposal prepared by a knowledgeable computer expert who also is an expert in your industry's needs becomes the solid rock of information upon which to base your agreement with the vendor.

Having thus armed yourself, request the following dated clause be put in your purchase agreement: "This agreement shall incorporate as part of the agreement my company's original Request for Proposal; vendor's response proposal; and all related amendments, letters and correspondence, sales brochures, system printouts and reports, user manuals and software documentation."

The second step is having qualified, experienced help when evaluating software, hardware, support and, of course, costs, so that the right questions can be asked and the answers later added to the contract. This should be someone who fully understands how a particular set of software features relate to your defined needs (how you buy, how you stock, how you sell) and someone who understands what the software can and can't do.

Now you can add a clause to your contract that will enforce promises made during demonstrations and informal discussions: "The contract should include a complete description of all proposed software modifications and enhancements to include: [list each promised item]."

Some of the things that must be included in the contract are the following:

- An airtight escrow agreement if the source code is not included in the deal. Placing software in stagnant escrow is not enough. Software is a living, growing thing, continually being enhanced and updated as time passes and users' needs change. Software should be placed in escrow with a third party that will guarantee the source code will be maintained at its most current version and include enhancements and/or modifications that have been made to the purchaser's version of the software.
- The Duty of Care clause whereby the vendor acknowledges that the buyer relied on the vendor's expert knowledge of his products when deciding which hardware and software to buy. In the past, courts have assumed the vendor is a professional (akin to a doctor), an expert in the field, that understands both computer industry technology and the user's business as it pertains to the software being sold. Failure to honor this clause is presumably malpractice.
- The best financial terms possible for ultimate leverage. For example, each of the following items comprise a differing percentage of the total purchase price: downpayment on hardware and software, delivery and installation of hardware, installation and demonstration of software and implementation of software to meet acceptance criteria. Don't be left owing so little that you've lost your clout.
- As many throwaway clauses as you and your consultant think will be necessary for the term of the negotiations. You have to be prepared for give-and-take, and clever throwaways are your ace in the hole.
- And, depending upon individual situations, there are dozens of other critical clauses too numerous to mention here.

The computer illiterate purchaser is most vulnerable in three areas: what a computer can do to improve his situation, what the product really does beneath the demonstration sales sizzle and and how to protect himself. This lack of knowledge on the part of the purchaser is the precursor of the dramatic increase in computer-related litigation.

When negotiating a computer contract, your company's lawyer should, of course, be included on the negotiating team. If the lawyer does not have a computer background, however, the guidance and advice of a qualified computer expert with experience in computer contract negotiations is necessary.

You should negotiate the contract with the help of your computer consultant. Then have your lawyer review the agreement to add the necessary legal terms and phrases to make it binding and best protect your interests. In summary, don't forget that the best defense is a good offense. Remember the following:

- Prepare correctly and include those upfront documents — the detailed Request For Proposal and the vendor's response proposal.
- Negotiate. You can only get what you ask for (maybe).
- Know what the critical clauses are for your situation.

Be wary of vendors that haven't enough faith in their products to allow the purchaser to insert performance guarantees into their contracts.

Remember: There are few painless computer implementations no matter how qualified the vendor, how good the equipment and software or how sophisticated the user. Computerization is invariably beset with unforeseen problems. Cover your bets and better your odds by getting all of the qualified help you can when negotiating and contracting for your data processing needs.

Yonda is the president and principal consultant of Computer Solutions, Rochester, N.Y., an independent management consulting firm that helps businesses define and select their data processing needs and negotiate contracts.

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WHAT THE EXPERTS SAY

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Savant Institute, London 1982

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—Arthur Lemay
Industry Analyst

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Software Maintenance News
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CIRCLE READER SERVICE NUMBER 46

Lotus Busters!

• BY • LEE • WHITE •

Lotus Development Corp.'s 1-2-3 is a phenomenal success story. Can the competition make a dent in 1-2-3 sales?

Among the many revolutionary products and technologies that have changed the shape of data processing and the corporate environment, it can be argued that the single piece of software that most dramatically altered white-collar America was Lotus Development Corp.'s 1-2-3.

1-2-3 has held its own since first bursting onto the computing scene in early 1983. The company was formed with eight employees in April 1982; 1-2-3 was shipped nine months later.

Although a company spokeswoman declined to state exactly how many copies of 1-2-3 have been sold to date, she did say that there are over 1.4 million users of 1-2-3 today. When put side by side with a December 16, 1985 *Computerworld* article on the current installed base of five million IBM Personal Computers and PC-compatibles, it is easy to see what an impact 1-2-3 has had on the spreadsheet marketplace — there is more than one Lotus user for every five IBM PCs or PC-compatibles.

In the same issue of *Computerworld*, however, is the projected 1986 installed base of PCs and PC-compatibles; it is expected that another 2.5 million units will be sold this year alone.

While 1-2-3's market share is awesome, the market predictions have indicated that the field is wide open for 1-2-3 look-alikes/work-alikes. (1-2-3 look-alikes are products that do exactly what 1-2-3 does; 1-2-3 work-alikes have either enhanced spreadsheet, graphics and data base facilities or the same characteristics in addition to other capabilities.)

And there are, according to industry experts, scores of such products on the market today. But as happened with the microcomputer hardware industry, the numbers will slim down considerably in the not-too-distant future. A brief look at some of these look-alike products (among them three programs, two totally integrated, high-end 1-2-3 work-alikes with enhanced functionality and one 1-2-3 look-alike at a fraction of the price) follows.

Enable is a $695 integrated software package from The Software Group in Ballston Lake, N.Y. It was developed to meet the perceived need for one software system that combines the user-friendliness of current microcomputer software with the power and functionality of general-purpose mini and mainframe computer software, according to the vendor.

The result was a package that operates on PCs and PC-compatibles and requires 192K bytes of random-access memory and two disk drives. Enable combines word processing, spreadsheet, data base management, graphics and telecommunications. It also has windowing capabilities allowing up to eight windows from different applications or files to be displayed on the screen at one time and data transfer between separate applications. The windows can be moved, shaped, overlapped or zoomed.

Enable has the ability to use files produced by Micropro International Corp.'s Wordstar, 1-2-3 and Ashton-Tate's Dbase II without the need for conversion and can produce files compatible with these packages. Enable will handle a spreadsheet with a 136K-byte workspace, a word processing document whose size is limited only by available disk space or a data base file with up to 130M bytes of data on a standard personal computer with 256K bytes of memory.

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> *Enable combines word processing, spreadsheet, data base management, graphics and telecommunications. It also has windowing capabilities allowing up to eight windows, and data transfer between separate applications.*

Andrew Beran, a financial analyst at Intel Corp. in Chandler, Ariz., has been a 1-2-3 user since it first came out, "even before Release 1A, from the very beginning." In the course of his work, Beran was looking for a product that would give him more capabilities than 1-2-3. He narrowed the field to Lotus' own Symphony and Enable. "When you compare the two, and I've used both, the advantages of Enable are apparent right away. You can manipulate more than one file at a time and combine the data from the different file formats." Beran also found Enable would print out graphs and perform data base functions much faster.

Although Beran could not speak for all of Intel's 30,000 employees, his group is using Enable within Intel's military operation primarily for forecasting, both for calculation and presentation and for all the follow-up reports. He has not, however, replaced 1-2-3 with Enable. "We use 1-2-3 for the things that it does better. It has a much larger spreadsheet," Beran said. But once the data is brought down to a more concise size, Beran explained, it can be imported directly into Enable "without any fancy footwork. It's a matter of saying, 'retrieve the file.' It double-checks and asks if it is a Lotus file because it doesn't recognize the extension, and five seconds later there's your file on the screen."

Beran's one caution was that Enable is not yet compatible with Version 2 of 1-2-3. Files created in Version 2 must therefore be translated to a Version 1A file, at which point Enable will accept the file.

But whatever shortcomings others think Enable may have, Evan Wilner called the product the most powerful tool of its kind. Wilner, the first and only public advocate for the state of Delaware, represents the interests of consumers in setting the prices and conditions of public utilities services, accounting for approximately $800 million annually.

Because Delaware's various departments operate independently, Wilner took the time to educate himself about minicomputer and mainframe modeling. It was not enough for Wilner to find out what if; he also had to know why. "I knew, based on my own experience, that 1-2-3 is inherently not capable of documentation. In addition, while [1-2-3] is certainly the U.S.'s most abused data base manager, it doesn't do that very well either," Wilner said.

Wilner's office receives detailed financial and sales information on a monthly basis from a large electric and gas company. This information is entered into giant 1-2-3 models that had been created by two outside consultants. The model grew to 2.8M bytes. By migrating this model into Enable, Wilner's office was able to evaluate whether the utility earned too much money and spent too much money. They were also able to find out "the consequences of owning shares in some of the poorest-performing nuclear reactors in the U.S. [Salem 1 and 2 reactors located on an artificial island off the state of New Jersey]," Wilner explained.

Wilner stated that if they were just starting up today, they would build the

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CIRCLE READER SERVICE NUMBER 54

models in Enable. But even though the models were built in 1-2-3, Wilner was able to import the files "without any modifications into Enable. I am aware of nothing that would even conceptually approach it," Wilner said.

Another product making footpaths if not inroads into the 1-2-3 market is Javelin Software Corp.'s Javelin. Billed as business analysis and reporting software, Javelin was recently named Software Product of the Year by the editors of *Infoworld*.

In addition to its ability to read and transfer data from 1-2-3 files, Javelin reads text files in ASCII format. The program provides 75 business functions including lead, lag, present value and depreciation. Javelin also includes five types of building blocks to represent universal business calculations like consolidation, time delays and lookup tables.

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> *One of Javelin's most critical features, one that surely separates it from 1-2-3, is that information is stored in a central information base of variables and formulas.*

Javelin commands are in pull-down menus, and a single keystroke provides access to multiple screens of on-line help. But one of Javelin's most critical features, one that surely separates it from 1-2-3, is that information is stored in a central information base of variables and formulas. Users may access one of 10 different views including worksheet, table and chart. Changes made to any one of the views causes the variable to change in the central information base.

The diagram view that shows which variables flow in and out of each other pictorially and is, in essence, self-documenting is a view most helpful to David Hansen, associate product manager with Bank of America in San Francisco. On the screen, "instead of looking at all the formulas themselves, you can print out the flowchart for each of those diagrams. On the left might be one box that says 'revenues,' and out of it comes two arrows pointing to two boxes that say 'fees' and 'interest,' showing that fees and interest feed into revenues," Hansen explained.

Hansen looked for that elusive something else because 1-2-3 was not flexible enough. "When you're locked into a worksheet, you don't have the flexibility to look at the analysis in many different ways," he explained. Another problem was that months after creation of the spreadsheet, when people asked to see the model, he would go back and find he had forgotten what he had done. "It would take a long time to read through each cell and find out what kind of calculations were going on," Hansen said.

Hansen has completely replaced 1-2-3 with Javelin. However, Jeffrey Kinrich, senior manager in the management consulting services group at Price Waterhouse in Los Angeles, has not.

A 1-2-3 user since the beginning and a Visicalc user before that, Kinrich still uses 1-2-3 for "quick and dirty, four rows and three columns, gotta get an answer spreadsheets," when he has about five minutes to get one done. However, Kinrich's job requires a lot of mathematical modeling and 'what if' is rarely the question he needs to have answered. "The operative phrase for us is 'but for.' What that means is 'but for the dastardly deeds the other guy did to my client, what would have happened,' so we're modeling a world that never was. If they hadn't done so-and-so, then my client would have had more sales and more profits and that's the damage that we're claiming in our lawsuit," Kinrich explained.

Because these lawsuits are extensive and Kinrich's work can take more than a year to accomplish, he needed to design models that could be modified and understood after months of inactivity. "If I had to pick a few powerful Javelin features, the first would be the ability to read and understand the model. Even more important, though, is the ability to focus on the analysis and not the numbers. What thought process got you to the number is what often matters," Kinrich said. Other strong points include indented tree structure, which provides Javelin users with the ability to describe the model and formulas and thus be able to talk about it to other people, and the time orientation, which prevents users from entering data into a cell in the wrong time period.

Kinrich is not the only one to favor Javelin. Several Price Waterhouse colleagues who do financial modeling as opposed to simple spreadsheet creation are

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very impressed with Javelin.

While the above packages take 1-2-3 and add great numbers of enhancements, Adam Osborne's firm, Paperback Software, has introduced a product — VP Planner — that is compatible with 1-2-3 files, macros and worksheets and perhaps goes it one or two better. What VP Planner has going for it, however, is the price, $99.95, including concise and well-written documentation. In view of the fact that Lotus Development is charging customers $150 for an upgrade to Version 2 ($495 for the product itself) and has plans to withdraw Version 1A from the market, VP Planner might slide into a market niche painlessly and quickly.

> *"Our customers will pay what they have to pay to get 1-2-3. I don't know that the volume would go up one iota if the price suddenly dropped by half."*
>
> **— Richard Loftin**
> **Corporate Software, Inc.**

Jim Englander, who writes a software newsletter when he isn't working full-time at a huge East Coast high-technology firm, was asked to be a beta test site for VP Planner. He calls VP Planner "a 110% clone," and lauded the program's sparse matrix, pioneered by Osborne's company. In 1-2-3, if a number is entered into cell A1 and another number is entered into cell Z20, A1 and Z20 are stored along with all the cells in between. With a sparse matrix, if only cells A1 and Z20 are filled, only those two cells are stored. This not only saves space in memory but makes reloading and recalculating much faster.

Englander also praised other pieces of the VP Planner package. "VP Planner has something to offer that 1-2-3 doesn't and that is an extraordinarily clean and easy interface to Dbase II and III. You have to do translation things to get Dbase files into Lotus. You don't with VP Planner," Englander explained.

The enhanced spreadsheet capability was what drew Dave Hilger of Electronic Data Systems (EDS) to VP Planner. Hilger was a 1-2-3 user, but the computer's internal memory capability was limited to 640K bytes and the spreadsheets Hilger was dealing with were large. "I was constantly getting 'memory full' on the screen. At that point I'd either have to condense the program or rearrange the data or split up the data into two different spreadsheets," Hilger said.

Hilger asked members of EDS' microcomputer support group for help, and they suggested he try VP Planner. He explained VP Planner uses a hard disk interface rather than keeping everything in internal memory. "[VP Planner] has taken spreadsheets that would not run in 1-2-3 or were using up all the memory in 1-2-3 and allowed me to expand them," Hilger explained.

Osborne admits the success of VP Planner has to do primarily with its similarity to 1-2-3. "Anyone who wants to get into the burgeoning spreadsheet/data base market simply has to conform to standards, and there is no question that within the corporate market 1-2-3 is the spreadsheet standard to the point where, frankly, there is no equivalent," Osborne said.

Once Osborne overcomes problems of distribution channels and the inability to compete in advertising with the power and money of Lotus Development, he may indeed have a winner on his hands, especially now that the $150 price tag on the 1-2-3 upgrade to Version 2 has angered many corporate users.

But whether corporate users are looking for a replacement or enhancement to 1-2-3 depends on who's doing the talking. Obviously representatives from The Software Group, Javelin Software Corp. and Paperback Software think there is a large niche for their products. But Paul Cubbage, by profession a senior industry analyst with San Jose, Calif.-based market research firm Dataquest and by choice a happy user of VP Planner, said corporations are not price sensitive.

Perhaps corporations don't care what 1-2-3 costs. Perhaps the 1-2-3 bastions are so well-entrenched that nothing could dislodge them. Perhaps the name alone is enough to allow Lotus Development to rest on its laurels for time immemorial.

Richard Loftin, director of marketing for Corporate Software, Inc. in Canton, Mass., the largest distributor of microcomputer software to Fortune 1000 companies, agrees with Cubbage. "Our customers will pay what they have to pay to get 1-2-3. I don't know that the volume would go up one iota if the price suddenly dropped by half." ■

White is a senior writer at Computerworld Focus.

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CIRCLE READER SERVICE NUMBER 75

Gaining Control Of Maintenance

DAVE RIDLEY

·BY·STAN·KOLODZIEJ·

MIS continues to be in a dilemma over software maintenance. Many software vendors are actively promoting fourth-generation language systems and tools as solutions to an alarming backlog of new mainframe applications. This leaves MIS/data processing personnel trying to salvage as much of their old mainframe programs as possible.

To date, enhancing older, primarily Cobol programs has been a time-consuming, labor-intensive affair, draining data processing resources away from new applications. It has also contributed to an applications backlog conservatively placed at two years or more at most U.S. mainframe shops.

"It's a simple fact that most large data processing shops need outside help putting new systems in," Dan Ryan, senior associate at Boston Systems Group, Boston, Mass., explained. "They're too busy maintaining what they already have."

Maintaining old programs puts the MIS/data processing department in a squeeze. On one side are users and administration applying pressure to get new systems up and running quickly. On the other side is the enormous stake in time and money that has gone into building systems using traditional third-generation languages over the past 20 years. Few companies have been willing to abandon the slow but proven ground of third-generation programming for the vagaries of fourth-generation promises. In the meantime application backlogs increase.

"Fourth-generation languages have been oversold as tools for large systems," T. Capers Jones, chairman of Software Productivity Research, Inc., Cambridge, Mass., claimed. "The biggest fourth-generation application anybody has written is probably not even as big as 50,000 lines of equivalent Cobol. When you get into the half-million or million line systems in mainframes, fourth-generation just can't stand up."

They can in smaller microcomputer and minicomputer systems, however. Here, fourth-generation application development tools are being used to produce well-documented, structured code stressing accuracy upfront in the design phase, minimizing the need for program maintenance later on. Programs developed on these smaller systems can then be migrated up to mainframes.

However, such micro development systems can be beneficial for large system software maintenance, as well. Development of these smaller programs can offload some of the programming burden from data processing staff and mainframe hardware already straining from the applications backlog and day-to-day processing. Many of these development tools do their work on stand-alone microcomputers, eliminating the need to tie up mainframe memory in producing new programs. These systems also provide the means for programmers to gradually become acquainted with fourth-generation languages without the stress involved of revising hardcore mainframe programs.

But there is a down side to these micro-based systems. Some of the less expensive ones, for example, require end users to do much of the actual programming, a situation that is helping create a small market for micro software maintenance.

"You tend to have people who are not programmers producing some weird results," Jan Gegliotti, managing associate at Index Systems, Inc., Cambridge, Mass., explained, "and a whole department can come to rely on them. Sometimes you have to go in and restructure everything."

Pierre Schwob, president of PRS-Program Research & Software Corp., a New York City developer of customized micro software systems, explained that most MIS departments do not have the time or personnel to install or modify micro programs. "They are busy with maintaining their bread-and-butter programs."

Figures vary, but most industry analysts place mainframe software maintenance as absorbing anywhere from 50% to 75% of data processing resources in a typical large corporation. Even when programmers find time to work on new applications, output from debugging old Cobol programs often averages only 10 or 15 lines a day.

"Some time between now and the end of the century more than half of the professional programmers in the U.S. are going to be working on enhancements and maintaining software rather than new development," according to Jones. "By the year 2000, two-thirds of the programmers will be doing maintenance."

Despite the huge vested interest in established Cobol programs, there has been to date a surprising lack of software tools that MIS/data processing personnel could use to revise the old programs to suit new application requirements. Modifying old programs can be slower than writing new ones, yet companies realize that scrapping an old system for a new one can be more disruptive and expensive than remaining with the old.

Systems consultants make a lucrative business in helping companies cope with this problem by trying to streamline and speed the process of revising old programs written in third-generation languages.

"We've found that in a number of cases," Bob Morison, senior associate of Index Systems explained, "the importance of a system has been overrated by an organization."

Systems consultants like Index Systems can provide document updating, retraining of staff and monitoring application performance. Recording program segments or redesigning data structures can be performed to preserve system strength while correcting deficiencies. New features can be built on top of or around current systems, using fourth-generation language tools for management reporting or transferring data to a microcomputer for analysis. A final alternative would be for the system to be rebuilt or eliminated altogether.

"In this case," Morison said, "the system will have been providing marginal value at relatively high cost. It might be better to scrap it and start again."

Before the above options are considered, however, Morison added that companies can be their own worst enemies. "There can be prolonged debate about renewal objectives, and this is harmful," Morison said. "It can extend the cost of maintaining an obsolete system.

"Another common pitfall is the inflated value most companies place on their existing systems. They often do not realize that major system components may have fallen into disuse or fall short of objectives."

Ryan at Boston Systems Group said complete documentation for clients is a major objective when his company develops new systems.

"We like to get them to the point where they can handle their own maintenance," he explained. "Concise documentation is half the battle. We don't and I know clients don't like to have perpetual maintenance agreements. To help them, we've developed a number of our own standards and methodologies over the years to produce clearer documentation."

The emphasis on better documentation has become an important factor to lessen maintenance costs after a new system has been installed. For example, Syncsort, Inc., Englewood Cliffs, N.J., and Computer Associates International, Inc., Jericho, N.Y., both major players in the IBM mainframe software field, have introduced products that increase the output of structured documentation, a factor Syncsort claimed can decrease programmer maintenance costs by as much as 20% in the long run.

Such tools are important for new software development and have an impact on maintenance, but what about thousands of aging Cobol programs still in use?

Explained one managing director of systems development at a major financial company, "Like many shops we have a lot of that code that's been modified hundreds of times. Even if it was originally structured, and in a lot of cases it was not, it has become unstructured from all the modifications from the various people who have worked on it over the years."

Most existing Cobol programs are unstructured programs that have been written in so-called spaghetti code, making later modification a slow and often painful process, prone to errors. The fact that unstructured, modified programs become harder to modify over the years makes it even more difficult for new programmers coming onto an older system to get up to speed, making for a long learning curve over time.

"In modifying a program," explained Steve Steiling, managing director of systems development at Federal Express Corp., Memphis, Tenn., "there may be several things going on, different routines, different tasks that take place. If those tasks are segmented, they are structured so to speak."

Restructuring old unstructured Cobol code is becoming an important weapon in the war on software maintenance and is proving a lucrative area for those vendors coming into the market with Cobol restructuring products. Some of these products have been out for over a year, but the market has been given a big boost by the recent entrance of IBM with its Cobol/Structuring Facility (SF).

One of the first companies in the restructuring market was Language Technology, Inc., the Salem, Mass., maker of the Recoder restructuring system. "In testing the viability of the market," Bill Engel, president of Language Technology, said, "we found it's immense. There are some 77 billion lines of unstructured IBM Cobol out there today. Up until this point, the market has been reticent to believe that anything is possible because they have been deceived so badly in the past and reluctant to believe that anything could be done with that old Cobol rather than just survive with it."

Engel added that he's been surprised at how quickly the market for Cobol restructuring has emerged. "By virtue of its size and lack of sophistication and their built-in disbelief," he said, "we were expecting a hard market to crack. The fact that some major clients have taken to it so quickly is an indication of

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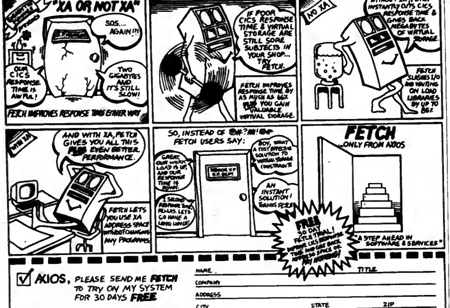
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CIRCLE READER SERVICE NUMBER 40

Straight talk about application software packages.

"Most application software packages are functionally rich. The problem is, that's simply not enough."

While everyone agrees that packaged applications possess great potential to save time and money, you'll hear a lot of people—from MIS directors to operations managers—tell you the ones their companies have implemented fall somewhere short of satisfactory.

Typical limitations include the fact that the packages require such extensive modification that the savings they seemed to offer totally disappear. Another common complaint is that one application package fails to integrate with another. A third shortcoming, and perhaps the most common, is that packaged applications cannot be easily adapted to reflect the changing nature of the business.

You have only to look at the architecture of most of the applications currently in use to understand why these problems exist.

Many companies today depend on applications designed with technology from the 60's and 70's. Some are 2nd generation applications built without any reliance on database architecture. Others are 3rd generation applications that provide only a generalized *interface* to a database management system; in addition, many application vendors provide a common front end user interface to mask inefficient architecture. The result is that these 3rd generation applications realize only about 10% of the power of a DBMS. *And that's simply not enough.*

Without full use of the facilities of a superior DBMS, users of application software find it extremely difficult to adapt and extend an application package to their current as well as to their future business needs. And *only* when an application is built with advanced database technology can it provide the sharing of data that leads to functional integration between different application modules.

Ultimately, what's required is software that goes beyond the conventional packaged applications approach.

What's required is 4th generation applications software—software that's rich in functionality, and whose underlying architecture is built on, and takes full advantage of, advanced database technology.

Fourth generation application software is created using a comprehensive application development facility combining a fourth generation language and end user query and reporting facilities with an integrated data dictionary. Furthermore, fourth generation application packages are functionally integrated, sharing common data between independent modules. This creates an environment to easily adapt and extend an application package, and provides realtime access to all information.

Only fourth generation application software packages enable a company to realize the full potential of packaged applications.

It is clear, therefore, that all application packages of the future will be built using this technology...because it doesn't make sense any other way.

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2. Functionally Integrated

Businesses today demand applications to do more than address individual functions. Businesses today need applications that recognize the interdependencies within an organization—in short, applications that can share data. For example, efficient real-time, four-way matching of invoices with receiving, purchase and inspection documents can only be achieved through true sharing of data, and this sharing of data can only be achieved with an advanced database technology which delivers that integration. Redundancies are eliminated and productivity is increased when all applications dynamically reflect the operations of the organization. By sharing an architecture that provides for optimum use of an organization's information, Cullinet's manufacturing, financial, human resources and banking applications fulfill this need.

3. Easy to Tailor

Although many businesses appear on the surface to operate in a common fashion, each, in fact, is unique. Applications must therefore be built with an optimized set of tools that permits them to be adapted to a company's way of doing business, rather than having the company have to adapt to accommodate the software. Cullinet applications are designed to accommodate change. They provide the means to personalize screen layouts, capture new information, reformat reports, resequence transactions, and change messages without impacting the entire environment. Only Cullinet's applications can provide this environment for adaptability through their integration with advanced database technology. In this way, Cullinet applications give users the independence to adapt them—quickly and efficiently—to meet the unique requirements of the business.

4. Easy to Extend

As a business changes and grows, so do its needs and requirements. Cullinet provides easy to use, menu-driven facilities that permit functional extension of an application while preserving integration. An end user can quickly react to new requirements by prototyping an application functionally, developing new reports and performing ad hoc queries immediately. MIS can efficiently develop new, associated applications sharing common data and built utilizing the existing architecture. The Cullinet architecture segments the program logic, edit and validation criteria, as well as the security and recovery process, and therefore the complexity of creating new application functionality is significantly reduced.

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CIRCLE READER SERVICE NUMBER 70

how much of a problem maintenance has become."

Recoder, which is licensed for $150,000, is being used at both Federal Express Corp. in Memphis and The Hartford Insurance Group, Hartford, Conn. Jack Crawford, director of Information Management Systems at The Hartford Insurance Group, said over 25% of the company's total expenses are DP-related and a large part of that is made up of software maintenance costs. The Hartford Insurance Group identified several million lines of code developed in the 1970s that would have to be restructured. Crawford has estimated that the pilot testing carried out using Recoder indicated program maintenance costs could be improved from 25% to 75%.

At Shearson Lehmann Brothers, Inc., New York City, the company has been using regression testing techniques for producing more efficient code for modified programs running under IBM's Customer Information Control System (CICS).

Florence Bell, manager of testing services at Shearson-Lehmann, explained that such testing, using Verify from On-Line Software International, Inc., Fort Lee, N.J., will pay dividends later on. This will happen as a result of reducing their present substantial amount of maintenance and modification the company carries out on its brokerage programs. Bell added that Verify can also be used to test and produce clear documentation for their programmers who are just underway migrating programs to IBM's latest release of CICS, Version 1.7.

"Regression testing occurs," Joe Olynick, assistant vice-president of On-Line Software International, said, "when a programmer goes back and tests an entire program, not just the 5% or 10% of a program that is usually modified.

"A dilemma occurs, however, when a programmer or department wants to get an application out for an end user, but make a small change. Even in development stages, changes are constantly being given to the data processing people. Here they make a decision. If they went back and regression-tested everything, they could never deliver the program on time. Instead, they usually just test part of the program and hope the rest will work out well. Regression testing until now was just not feasible."

Maintenance looms larger as more IBM shops begin migrating to CICS 1.7. Business programs that run in a teleprocessing network run in more than an estimated 20,000 installations using CICS, which promotes the running of on-line applications.

"What the system programmer is concerned about," Olynick explained, "is that he does not put in a new release of CICS and affect the running of an application program. Verify can be used to capture a day's work and then come back at night or on the weekend, restore the files to their starting point, use the same programs that were in production, but use that new release of CICS that he's just brought in from IBM. He can then automatically check that the screens and files still look the same. What he wants is to make a change to the operating environment and verify that no change in the application process occurred."

> *Such tools could allay the concern that there will not be enough resources to meet programming requirements in the year 2000.*

How big an impact will such tools for renewing old programs have on maintenance and data processing productivity down the road? "The change can be dramatic," Language Technology's Engel said. "If you view a typical Fortune 1000 company having 70% of their programming resources currently devoted to maintenance, and if we can deliver a 50% reduction in maintenance expenses, that means 35% of the MIS resources, overall, can be channeled into chipping away at the applications backlog.

"This will allow MIS to deal more with issues like new technology migration and other things that are being put on the back burner for now because of the maintenance drain." Engel added that such tools could help allay the concern that there will not be enough programming resources to meet programming requirements in the year 2000.

Jones added that he recently interviewed 26 maintenance programmers to find out what the impact was in making a change to a structured program compared with an unstructured program.

"The net feeling was that making changes to structured programs would involve about a quarter of the time than with the unstructured version," he explained. "And each successive stage of modifications to a system becomes easier, so the benefit is long-term. Unfortunately, balancing this is the fact that production libraries continue to increase in corporations. There is also less need to develop new applications. What we're talking about is keeping maintenance under control, not eliminating it." ■

Kolodziej is a senior writer at Computerworld Focus.

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CIRCLE READER SERVICE NUMBER 57

Maintenance Plans And Strategies

DAVE RIDLEY

BY TOM O'FLAHERTY

The principal need — and failing — of most software maintenance activities today is that there is very little strategy or planning. Tool improvements, whether they be the use of fourth-generation languages or Cobol restructurers, may only further distract or postpone the necessary action of developing a maintenance strategy.

Unfortunately, almost everything connected with maintenance is fuzzy, starting with its definition.

Inquiring about maintenance is somewhat like the nine blind men and the elephant — no one really agrees. Precise definitions are seen to be important only for exercises such as comparing proportions of resources spent on maintenance by different companies.

For most actual maintenance planning, definitions are generally implicit or ignored. This encourages the ad hoc mentality so prevalent in maintenance activities. For the purposes of this article, maintenance will be defined as all the events that occur after an application has initially been installed.

For this analysis, maintenance is viewed as being made up of three major types of activities with associated subactivities:

- Software nonperformance, which can be either complete or partial.
- Failure to meet specifications, which can be either pervasive or isolated.
- Improvements beyond specifications, which can be major or marginal.

Besides being theoretically different, these activities tend to be quite different operationally as well.

Note that there is a gray area between partial software nonperformance and a pervasive failure to meet specifications. Also, in the real world, specifications change, evolve or become more focused: At some point an application may be changed not to meet the old specification better, but instead to meet a new specification (or, commonly and confusingly, a mixture of old and new specifications). This is one reason why so many organizations have difficulty in defining whether an activity is categorized as either maintenance, enhancement or development.

From an operational standpoint it becomes very important whether or not a maintenance activity is foreseeable. Even complete application nonperformance is sometimes, at least partially, foreseen (although not perhaps communicated widely to other personnel). On the other hand, major system enhancements are often not foreseen (and very often not foreseeable) because the thrust of the underlying business may have changed after the original system specifications were set.

An estimate of the degree to which these foreseen/unforeseen situations are common is shown in Figure 1, Page 38. Additional points include:

- Unforeseen partial software nonperformance is all too common a result of system designers not understanding how user requirements might change. Simple errors that are not caught in the testing process are also important.
- Pervasive failure to meet specifications is less usual. Where foreseen, it can be a result of a hope-for-the-best attitude or an overpoliticized environment. Unforeseen failures to meet specifications arise from such things as imprecise specifications, poor communications between users and system builders, excessive reliance by users on information systems, schedule pressures or poor testing.

Much of maintenance is now reactive or, at best, planned in an isolated iterative manner. For example, using software releases is a good approach for making changes more efficiently. But even the relatively small number of organizations that use software releases rarely look beyond the current release. Thus, on closer inspection, the software release is usually just a packaging of reactive changes.

Very few organizations keep an ongoing set of analytical software maintenance records. This requires going beyond a log of software errors and classifying activities in a similar fashion to the categories shown in Figure 1. This

Maintenance Activity	Foreseen	Unforeseen
Software nonperformance		
Complete	1	3
Partial	2	5
Failure to meet specifications		
Pervasive	2	3
Isolated	3	4
Improvements beyond specifications		
Major	3	5
Marginal	5	5

1 = Not common
5 = Very common

Figure 1. Extent To Which Maintenance Activities Are Foreseen

analysis plus records of the documented backlog (and undocumented backlog, where it is feasible to estimate it) gives a more complete picture of the maintenance requirements necessary for an organization.

It is very hard to get where you are going if you don't know where you've been. Because the business needs of enterprises differ and the information system technical structure of organizations also differ, maintenance profiles tend to be organization-specific. This is why an analysis of software maintenance activities is so important.

Obviously, the more that maintenance activities can be foreseen, the more they can be planned. Many organizations will be surprised at the extent to which all categories of maintenance activities can be predicted. This strategy assumes management is receptive to hearing the news that could in the short-term be bad news, exposing potential problems in what might otherwise have been considered solid systems.

Consequently, being able to foresee maintenance needs is as much an exercise in internal communications as it is in business and technical planning. Management attitude is critical. Although using procedures can help, they can at best only formalize an attitude.

Unfortunately, procedures can sometimes get in the way of learning valuable information arising from half-formed suspicions or embarrassing self-realizations. An organization that has a tradition of not picking scapegoats or exacting reprisals will be more likely to learn about unknown maintenance needs.

Why is managing maintenance important? There are two important reasons for needing to manage and plan maintenance; one is narrow and the other broad.

First, look at maintenance from the input side. Typically, half of information system professional personnel time is engaged in maintenance, with this proportion rising to 75% in an increasing number of organizations. At the least, too many information system resources are being spent on maintenance for it not to be taken seriously.

However, the real maintenance challenges and need for planning arise from business-related issues. It has been observed that U.S. business generally has had to become much more adaptive and flexible in the last five or 10 years. This had had an obvious impact on computer systems and their need to adjust to these circumstances.

As they become more adaptive, computer systems are becoming much more important to the core business functions of an increasing number of companies. This combination of increased importance and increased change is a potent one.

This means that maintenance is less an internal information system technical matter and much more a concern of the entire organization. For example, events that the information system organization views as absolutely unforeseeable, business and market planners elsewhere in the organization might see as all but assured.

Maintenance activities are now largely undirected and in many information system organizations these activities are viewed as ancillary to the more important matter of developing new applications. Improved tools can speed up this process, but will not in themselves give it direction.

Because of the changes in the underlying business needs, maintenance activities will become more important as more applications undergo constant change. The dividing line between new development and maintenance will become harder to see. Organizations will find that they need organizational and planning structures to cope with this change. ◼

O'Flaherty is a principal of Information Services Strategies, a Wood-Ridge, N.J.-based consulting firm. He advises information system departments and vendors on approaches to dealing with technological change.

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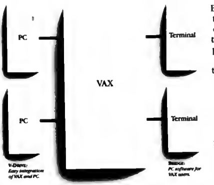
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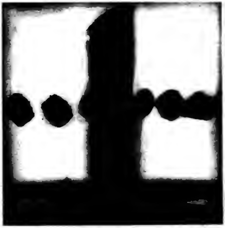
CIRCLE READER SERVICE NUMBER 73

Restructuring Your Cobol Programs



DAVE RIDLEY

·BY·GIRISH·PARIKH·

IBM's executive summary of its new product Cobol Structuring Facility (Cobol/SF) states the following: In many operations, program maintenace can require an inordinate amount of time and resources . . . often making your goals for profits, productivity and morale unattainable." IBM is right on target.

Software maintenance statistics confirm that most companies allocate 50% of their budgets every year for maintenance, which includes corrections and enhancements of existing programs. Most programmers spend more than 50% of their time on the ongoing maintenance. The worldwide annual software maintenance costs are estimated at $30 billion and the U.S. alone spends over $10 billion annually.

The idea of automated restructuring of existing unstructured programs to reduce software maintenance costs and solve maintenance problems overnight has some merit. With billions of lines of unstructured and almost undocumented code around, mostly in Cobol, the idea seems to be catching on.

In November 1985, IBM entered the software maintenance marketplace with its announcement of Cobol/SF at Guide 63, held in Dallas.

Cobol/SF is one of the first software maintenance products to use artificial intelligence in software maintenance.

An IBM spokeswoman explained the use of artificial intelligence in software maintenance as follows: Cobol/SF makes use of artificial techniques that involve the use of production rules, also known as IF-THEN rules. Each production rule, by itself, can only recognize a particular pattern in the input Cobol program. Any parts of the Cobol program matching the recognition pattern are then transformed into a new pattern.

However, when many such rules are collected together and allowed to act on the Cobol program in combination, the result is a process that can create a structured program that a programmer would create.

Cobol/SF uses production rules in two automatic processes. First, production rules are used in a preprocessing step to transform statements and procedures in the unstructured Cobol program into a format that can be structured. Second, production rules are used to transform the structured program generated by Cobol/SF into a top-down hierarchy of procedures.

Many of the pattern recognition or IF parts of the Cobol/SF rules are specified by recognition grammars that define the patterns to be recognized. The transformation or THEN parts of the rules are also specified by grammars. The production rules that Cobol/SF uses are drawn from the definition of the Cobol programming language and from structured programming principles. These rules have been integrated into the Cobol/SF logic to achieve more efficient execution.

Cobol/SF transforms the spaghetti logic of an unstructured Cobol program into a structured Cobol program with top-down hierarchical code. The restructured programs are single-entry/single-exist programs that contain no GOTO or ALTER program statements.

According to IBM, the product is useful for reducing software maintenance, facilitating program reengineering and enforcing structured programming standards during new development projects. Cobol/SF can restructure any Cobol program that compiles without error in VS Cobol II and contains no real-time interface code, such as Customer Information Control System (CICS). (VS Cobol II is IBM's version of the new ANSI Standard Cobol 85.)

The first three steps of the six-step restructuring process (see Figure 1, Page 42) involve program analysis of the unstructured existing program. The last three steps (program generation) produce a structured, well-documented version of the program. According to IBM's product overview, the steps include:

- Preparation of an unstructured program: If your existing program is not already in VS Cobol II syntax, it must be converted.

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Dianne Kearns
Director of Marketing
Lawson Associates, Inc.
Minneapolis, MN

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You should also verify that Cobol/SF syntax requirements are satisfied.

- Analysis mode: In this step, the Cobol/SF analyzes the existing program and generates a reengineering report that describes the transformations it can make to the existing program. It also identifies any problem area in the input program for your analysis and review.
- Optimization of an unstructured program: Guided by the report produced during analysis mode, you can redesign or reorganize any logical knots in the code to help make the final program more usable. This can result in improvements in the structured output.
- Generation mode: The process that occurred in analysis mode is repeated, this time using the improved input program. Then, a structured output program is produced, guided by controls on the structuring and formatting you select.
- Documentation of structured program: The individual structured procedures produced are natural units of documentation that you can read, understand and record.
- Verification of a structured program: To be certain that errors were not introduced during the preparation steps, you will probably want to verify functional equivalence with benchmark testing before returning the new program to operational use.

A restructuring product, though generally a useful tool, is not a panacea. There are differing opinions among experts on the benefits of automated restructuring.

Some think that although designing systems for ease of change can greatly lessen maintenance problems, systems poorly designed for continuing development and change cannot often have maintainability retrofitted.

If the original program is complex and unstructured, the automatically restructured program may not be much more useful in understanding the code. If the input to the engine is complex unstructured garbage, the output is structured (still complex) garbage.

Nicholas Zvegintzov, editor of *Software Maintenance News* and a leading expert on software maintenance tools, is enthusiastic about restructuring products. "Half the code in the universe is Cobol, and all of it can stand to be restructured. It [the Cobol restructurer] is a tool many people should have."

> ”
>
> *A restructuring product, though generally a useful tool, is not a panacea. There are differing opinions among experts on the benefits of automated restructuring - poorly designed systems often cannot have maintainability retrofitted.*

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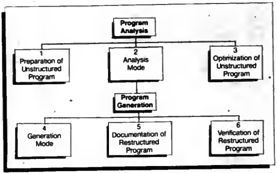
Program Analysis
1 Preparation of Unstructured Program
2 Analysis Mode
3 Optimization of Unstructured Program
Program Generation
4 Generation Mode
5 Documentation of Restructured Program
6 Verification of Restructured Program

Figure 1. Six Steps To Restructured Program

Zvegintzov was quoted in *Computerworld* (Nov. 25, 1985).

"A site that takes up restructuring will become addicted. Programmers will restructure after each modification, just to check against deterioration," Zvegintzov said in *Software Maintenance News*.

IBM has stated that there are no quantitative measures of productivity improvements using Cobol/SF, but that IBM believes that users may expect to have the same kinds of productivity improvements that have been experienced in using structured programming techniques in new program development.

The following method is one of several that can be used to assess the benefits of Cobol/SF or even to compare it with other Cobol restructuring products/services.

- Select a hard to maintain Cobol program of approximately 2,000 to 3,000 lines.
- Restructure it using each tool or method to be compared.
- Record costs, effort, time and training spent in each method when restructuring in step two. Collect data on the amount of work automated and the amount done manually. This will help assess if manual work can be automated, to what extent and at what cost. Also record any problems and their solutions.
- Compare. According to the budget, this comparison can be done in one of the following two ways:

Plant the (same) bugs in the programs. Give the bugged programs along with assignments to enhance the programs to several programmers trained in reading programs restructured with the restructuring tools and techniques to be compared. Allow them time to locate bugs and to develop design and code for enhancements. Record data such as time taken, problems encountered and so on. Review the collected data and performance of each programmer.

A other way is to continue maintaining the restructured programs in parallel mode for a few weeks or months, depending on the budget. Collect data while maintaining. Review data after the allocated time is over.

Each year, $30 billion is spent worldwide on maintenance, according to James Martin, an investor in Language Technology, Inc., marketers of the Cobol restructurer Recoder. If a good restructuring method saves only 1% annually, that is a savings of $300 million every year. The potential in restructuring Cobol programs (according to International Data Corp., the worldwide investment in Cobol programs is about $100 billion) seems to be unlimited.

The currently available Cobol restructuring products and/or services are primarily based on the concepts of functional structured programming and design developed by Bohm and Jacopini, Dijkstra, Mills and Constantine among others.

Another approach that can be even more effective in maintenance as well as in development is that of logical structured programming (also called data structured programming) pioneered by Jean Dominique Warnier, a French systems scientist who developed the powerful methods of program and system design known as Logical Construction of Programs/Logical Construction of Systems (LCP/LCS).

Automated restructuring is only the first step in exploring the vast and relatively unexplored world of software maintenance. It is indeed useful, but has limitations. It may treat only symptoms instead of real problems. Redevelopment (automated as much as possible) may be the only way to cure some problems. It will also facilitate migration, as appropriate, to modern software and hardware technologies such as fourth- and fifth-generation languages, data base management systems (DBMS) and microcomputers.‡ F

Parikh is a Chicago-based national consultant specializing in software maintenance and productivity. He has written several books in this field.

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CIRCLE READER SERVICE NUMBER 72

PURCHASING PRACTICES

Site Licensing: Users in the Driver's Seat

• BY • LEE • WHITE •

DAVE JOLY

Predictions are 1986 will be a year of budgetary constraints for MIS departments, yet increasingly sophisticated microcomputer end users will become more demanding. With less money to spend and more people to spend it, what will prevent the law of diminishing returns? Site licensing may be the answer, say vendors and users alike.

Site licenses are generally negotiated by the end-user organization and the vendor. The resulting license gives the organization authority to duplicate a specified or infinite number of copies of a master diskette at the user's site.

Site licenses hold more appeal to most users than the more traditional volume discount arrangements. Wayne Knabel, a partner with Ernst & Whinney in Akron, Ohio, has negotiated many site licenses, including one with Computer Associates International, Inc., which owns and markets Sorcim/IUS's Supercalc. Knabel gives short shrift to volume discounts, primarily because the dollar discount is rarely big enough.

On the surface, site licensees are seen as the primary beneficiaries of such agreements. However, vendors and end users are quick to point out that the benefits surely go both ways.

Management at Lifetree Software, Inc. in Monterey, Calif., began doing site licensing soon after they started business. "Several large corporations in San Francisco chose Volkswriter for word processing software, and they preferred to have a relationship directly with us for large volume acquisition," Jim Rogers, manager of corporate sales at Lifetree Software, explained. Lifetree Software executives came up with three different kinds of site licenses, none of which would be limited to the physical site: a networking license, a duplication license and a box-by-box license.

The benefits to Lifetree Software went far beyond the obvious — money in the bank. "One of the nicest things about a site license is the cooperative working relationship. Customer input in concert with that from other corporate clients has helped in the development of future versions of Volkswriter. It also provides a forum for discussion between people in a variety of different corporations that use our product," Rogers stated.

Another company doing a surprising amount of site licensing given the inexpensiveness of their product line is Borland International. Borland International was also approached by some of its corporate customers, even though "most companies' site licenses don't even approach our retail pricing," Spencer Leyton, vice-president of sales and business development at Borland International, said.

Sunil Subbakrishna, manager in the tax computer services department at Arthur Andersen in Chicago, negotiated what he believes was the first site license for Borland International. "We liked the product [Sidekick], and in our company site licensing is preferable to acquiring software on a piece-by-piece basis," Subbakrishna said.

The Arthur Andersen method of distributing software companywide is quite sophisticated and ideal for site-licensed products because there is already a network in place for distribution of internally created software. "Each one of the offices, both in the U.S. and in other countries, has a software librarian who gets a set of master diskettes," Subbakrishna explained.

While few companies have such sophisticated distribution channels, it is easy to see why site licensing is almost a necessity at Arthur Andersen. With over 2,500 microcomputers companywide and a prevailing attitude that stresses the use of microcomputers whenever possible, site licensing is their answer.

Presently, there is about one micro for each six people in the organization, and the computers are usually in a common area. "If people had to check out the software or if we had to be in the position of counting software all the time, the administrative burden would be so high that it might diminish the benefit of having the software." Subbakrishna concluded.

Another interesting sidelight to the issue of site licensing is the disposition of the retail dealer. The vendors surveyed by *Computerworld Focus* all prefer to include the retail dealer in the sale.

Rogers of Lifetree Software explained that any dealer can sell a site license for Volkswriter. "They sell from the same pricing list that we have established. And we pay a handsome commission to all dealers. The dealer does not have to default to the vendor at all." he said.

Such agreements between vendors and retail dealers make obvious sense. If retail dealers are left out of the big deals, they would be understandably angry, especially if the corporation purchasing large amounts of the software were the largest employer in that retail dealer's geographical area. That anger could translate into reluctance to push the vendor's product. But some end users prefer not to include the dealer in the sale, even if it costs the end user nothing.

With 5,000 micros and a highly trained and motivated staff, Thomas J. Buckholtz, office technology project coordinator at Pacific Gas and Electric (PG&E) in San Francisco, stated that avoidance of middlemen is standard operating procedure. "We're well-organized and don't need telephone hot lines and all the rest of that stuff." Buckholtz said.

Because of the sheer volume involved, support at PG&E is limited to key people contact. Buckholtz sees PG&E as a direct channel to the vendor on bugs. "We're avid beta testers because we want good products and we want to get ready to train on upgrades. When you get through all of these processes, you find the middleman has no role. He merely takes money out of it." he said.

Buckholtz is no stranger to the site licensing game. In fact, he became a kind of hero at PG&E and his reputation as a site license pioneer grows as he presents his seminars on successful site license negotiations. Buckholtz sees site licenses as beneficial for both vendor and user. On the user side, he cites the simplicity, predictability and low cost. PG&E receives one master diskette and one manual. All duplication is handled in-house, eliminating the need for inventory and filling out endless numbers of registration cards.

And theirs is a true site license, independent of use in almost all cases. They negotiate a fixed initial payment and usually a fixed annual maintenance fee to cover all upgrades. If the vendor doesn't provide valuable upgrades, they will discontinue the annual maintenance fee. "The licenses we have apply to all of our workstations. They apply to the current product that the vendor produces and typically seven years' worth of enhancements of that product on whatever machines they produce it for. We cannot force [the vendor] to produce for a particular machine, but if they do and we have that machine somewhere, then we have the right to use it." Buckholtz explained.

There are also advantages to the vendor, according to Buckholtz, among them immediate payment and a continuing revenue stream from the annual maintenance fees. "It's a very low-cost way of doing business." Buckholtz insisted. "The biggest cost to a first-time licensor is just getting going and negotiating the first deal."

Perhaps the most important benefit to vendors, though, is the close relationship they are able to develop with their large customers. Usually these end-user organizations are innovators. The innovative ways that these users discover to make the best use of the software often stretch the envelope that vendors may have originally envisioned for their product.

Ernst & Whinney's Knabel lauds Computer Associates responsiveness to suggestions from his company about Supercalc 3. "We provide them with a lot of feedback. And it's not a one-way street. Over the last four years, there have been three major upgrades [of Supercalc]. During all of that time, Lotus [Development Corp.] didn't do anything to their product until they were almost forced to by this last revision of Supercalc. I think with Lotus' upgraded version [1-2-3 Version 2] they've probably come back to parity [with Supercalc]. But I don't think they were going to do anything to that product until they were absolutely forced into it." Knabel said.

And what about the flip side — micro software companies that are not site licensing? Although many software companies are responding to user requests for site licensing, the notable holdouts are Lotus, with its immensely popular 1-2-3, and Ashton-Tate, developers of Dbase II, III, III Plus and Framework.

Lotus spokeswoman Betty Green confirmed that her company is not site licensing 1-2-3 and has no plans to put such an arrangement on the books. She insisted, however, that Lotus has instituted many other niceties to make corporate users happy. For instance, she said, "we've encrypted our software on hard disk and developed networking capabilities. With the upgrade [from Version 1.1 to 2.0], we let users destroy old disks instead of returning them, and we're offering volume discounts [on the upgrade]." Because Lotus is charging customers $150 for the upgrade, its discount (100 to 1,000 copies at $125; over 1,000 copies at $100 per upgrade) has struck many corporate customers as underwhelming.

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CIRCLE READER SERVICE NUMBER 49

Representatives of Ashton-Tate, on the other hand, seem perplexed by the whole issue of site licensing and appear to be genuinely interested in doing what its corporate customers want. As director of marketing programs for Ashton-Tate, Karen Orton is trying hard to understand what users really want when they say site licensing. She has come up with many plans for site licenses, but the responses from users have always been negative.

"We have found the people we're talking to really don't want to make copies. Most of them say they want a better way to handle upgrades, better support and protection against being sued for piracy," Orton said.

One of the ways Ashton-Tate found to fill their customers' needs was the establishment of the Corporate Emphasis Support Program. Any corporation that purchases 25 copies of Ashton-Tate's Dbase is automatically a member of that program. Another program sponsored by Ashton-Tate is designed for the microcomputer manager, who is given a special hot line. "Because [the micro manager] provides answers to 90% of the questions, when he has a question, it's really a toughie. He can call and ask our best people for an answer," Orton explained.

To some extent, responses from members of Ashton-Tate's corporate advisory board lend credence to Orton's assertions — and to some extent they don't.

"There are times when we do want the right to copy, specifically when we might include a package in a product that, to the user, would be transparent, something as simple as [Hayes Microcomputer Products, Inc.] Smartcom or [Microstuf, Inc.] Crosstalk. Then we would want the license to copy and some way of paying for it equitably," said Leon Wolf, systems specialist in the biomedical products department at E.I. Dupont de Nemours Co., Inc. in Wilmington, Del.

But there are two primary reasons that dissuade Wolf from recommending or searching out site license agreements. The first is that Dupont is able to negotiate agreements with a software distribution house for individual copies of products at prices "not much more than I could probably license it for." The second reason, Wolf said, is the belief that end users should bear the ultimate responsibility for their standalone applications. "I don't have anybody who uses a Dbase application over large numbers of users. If we're going to use a data base package and a lot of people need to use it, we'll use something that runs on our mainframe," Wolf explained.

The reasons behind Bruce Johnson's decision not to pursue site licensing agreements differ from Dupont's Wolf's. As manager of the personal computer resource center for Deloitte Haskins and Sells in New York City, Johnson is not averse to the concept of site licensing; however, he has found most site license agreements provide an unfavorable balance between vendor commitment and corporate restrictions. "I haven't found an approach that gives me the combination of price benefits and convenience of copying without imposing an undue restriction in terms of the amount of business I do with [that vendor]," Johnson said.

While Johnson is not "wild about being in the diskette duplication and publishing business," he would like the convenience of being able to give people copies when they want, especially in the case of replacement diskettes, without having to go back to the vendor. "If they priced it low enough, I'd be willing to take on those additional distribution responsibilities," Johnson said.

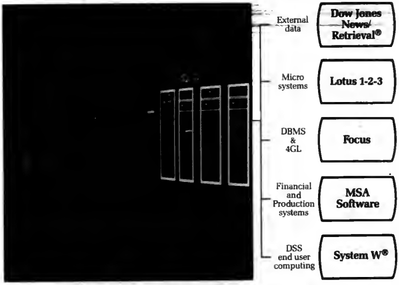
A particular problem for Johnson's large multinational company is that they have already bought more copies of programs than they will buy again. On his wish list for Ashton-Tate and Lotus is a credit for those copies he already owns. Deloitte Haskins and Sells uses Dbase, Multimate International's Multimate (now owned by Ashton-Tate) and 1-2-3 extensively.

"What I'm looking for in a site license is a way of somehow grandfathering in the volume that I've already purchased. Because I've bought several hundred copies of Multimate, reduce my volume for new business. Let's say to get a site license you need 500 copies. If I've already bought 300 copies, give me credit for those and let me have a site license if I just buy 200 more," Johnson stated. However, Johnson admitted that if he were starting from ground zero and found a product that had mass appeal to his organization, he would be interested in a site license for that product.

The conservative stances of the Ashton-Tates and the Lotuses regarding site licenses and, to some extent, volume discounts may change in the months and years to come. Perhaps these changes will be brought about by user demands. PG&E's Buckholtz takes a very firm stand on vendors that refuse to negotiate site licenses.

"We have found an unexpectedly high correlation between quality of product and product line and willingness to entertain the idea of a site license. We have never sacrificed any operational considerations with the selections we've made. If we had had to buy all this software by the package, it would have cost millions of dollars more than it did. And we wouldn't have done it. The marketplace would have been no wealthier for that, and we would have been that much poorer for it," Buckholtz concluded. F

White is a senior writer at Computerworld Focus.



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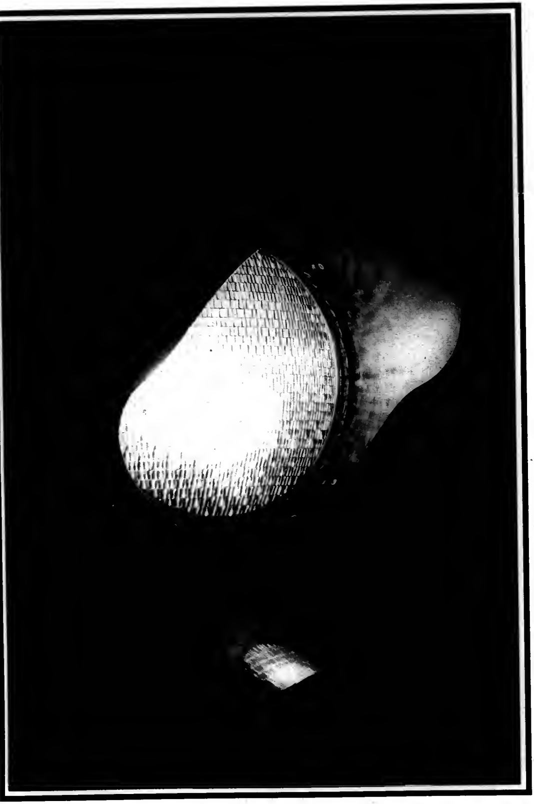

GEOFF O CONNELL

MARKET ANALYSIS

The Software Industry: Proceeding With Caution

• BY • MIKE • BRAUDE • & • SCOTT • SMITH •

Software is both the key means as well as the main barrier to using data and information processing for strategic planning, operational economies and, in fact, as competitive weapons. Data and function are scattered across different locations and computer architectures. The lack of clearly perceived standards for data/function access and interchange prevents users from bridging these gaps to offer effective access to data on a corporate basis, much less processing that data. IBM and some of the other key players understand this problem is a barrier to their growth and are therefore implementing strategies to enable customer growth. This is the basic force underlying the evolution of the System/370 software infrastructure.

Although IBM has to be the main player in this evolution, it is not as well-organized for the task as it should be. Because IBM's software is owned by the hardware manufacturing divisions, historically the emphasis has been to develop machine drivers rather than application enablers. For example, MVS is essentially a driver of water-cooled processors notwithstanding its product positioning as the strategic environment for large data base/data communications systems. VM is essentially a driver of air-cooled processors, whatever its future as IBM's vehicle for information centers, software development and engineering/scientific processing. IBM's IMS has always been a driver for storage subsystem — IBM 3350 and 3380 disk drives. While SQL/DB2 is getting a strong presentation as an applications enabler, it isn't clear that IBM's strategy for so using it, LU 6.2 and its other crucial software initiatives will be effective in the near term. It is IBM's challenge to make SQL/DB2 work and become a strong player in the high-end productivity tool market.

All these questions about the software infrastructure feed into the slowed growth rate of the System/370 software industry. While those worldwide revenues grew by 40% from 1983-84 to $5.3 billion ($3.2 billion to IBM), we expect the 1985 figure to be $6.5 billion ($4.1 billion to IBM), only a 23% gain. There are several key factors in this slowdown including the state of the general economy. Due to its large rental base, IBM should record a better year in 1985 than most independent software vendors. Performance among these vendors has varied considerably based on market niche.

Revenue growth for big-ticket data base management system (DBMS) and applications software vendors slowed to 8% for the first nine months of 1985, down from 48% for the comparable period in 1984 and 14% for the first six months of this year, according to Gartner Group statistics. A capital spending slowdown, lengthy product evaluation cycles, well-publicized installation difficulties and increased competition all have contributed to the dampened performance. We think growth will accelerate next year because users can only postpone applications development decisions for so long, but we have seen little visibility in any sector except perhaps the banking marketplace. Several vendors have seen a pickup in software sales to banks in the past three months. On the other hand systems software vendors have seen growth accelerate slightly from 27% for the first nine months of 1984 to 29% for the same period in 1985.

The DBMS marketplace is the tightest of all software industry sectors. Intense competition among a large number of vendors has drawn out sales cycles and led to aggressive price discounting. Surprisingly, IBM has been a factor here, and the promise of SQL/DB2 has rejuvenated IBM's competitive presence. Many users may remain on the sidelines until 1986 in order to take the time to sort through the myriad of product promises. Activity at Applied Data Research, Inc. (ADR) picked up in the last month due more to a change in the salesperson's compensation plan than to business conditions. The recent announcement of Ameritech's (a regional Bell operating company) acquisition of ADR should have little impact near term. While it isn't clear that Cullinet Software, Inc.'s business will pick up, we have noticed an improvement in user references for Cullinet Software's manufacturing applications packages. Applications software should play an increasingly significant role in Cullinet Software's future, pulling along DBMS sales, but possibly dampening margins due to support requirements.

On the applications front, only the banking sector has shown any signs of strength. Only Uccel Corp. reported a disappointing quarter in bank-software sales, perhaps reflecting renewed competition from Hogan Systems. We surmise that the slowdown in software sales to banks actually began last fall due to much publicized product and support weaknesses at Hogan Systems and Anacomp. Now, stronger references from pioneering banks are luring other banks back into the market. In addition, the pace of bank acquisition activity should slow in 1986, leaving banks free to focus attention on data processing. Finally, minor changes in government regulations such as a recent Federal Reserve ruling on overdrafts that could lead banks to reevaluate their software systems. The outlook for the application/DBMS vendors should improve by the second half of 1986 as users become more confident in both the economy and the software packages; however, we will look for an immediate turnaround.

While the DBMS and applications software markets have slowed considerably in 1985, the market for systems software utilities, predominantly data center management and programmer productivity tools, shows continued strength. Utility products generally priced in the $10,000 to $50,000 range require much less installation effort than applications packages and provide rapid paybacks to users in the form of operational efficiencies and cost containment. The purchase decisions are diffused among mid-level MIS managers, far removed from the corporate boardroom and the pressures of capital expenditure cycles. In fact, cutbacks in DP budgets often lead to the purchase of additional software utilities in order to squeeze more capacity from existing human and machine resources. We expect solid growth in systems software to continue through 1986 and beyond.

The systems software business consists of highly fragmented niche markets with boundaries drawn both by product and operating system. The hot product areas this year appear to be:

- Job acounting/charge back systems that enable MIS managers to measure resource usage and charge costs to end-user departments. Computer Associates International is dominant in DOS and MVS markets; VM Software has a strong position in the VM environment.
- Security packages that serve to protect data bases from unauthorized access. IBM is making a strong thrust in the MVS market with Release 1.7 of IBM's Resource Access Control Facility (RACF) security package, which may have in part been inspired by advances in product technology by independent leaders CGA Software Products Group, Inc. and Cambridge Systems Group. Computer Associates International and On-Line Software International lead the IBM DOS/VSE market. VM Software has momentum as well.
- Performance measurement/capacity planning tools that monitor machine performance and model future requirements. Morino Associates, Inc.; Candle Corp.; BGS Systems, Inc.; and Duquesne Systems, Inc. are among the market leaders.
- Disk/tape management systems that monitor space utilization. Uccel leads in the MVS environment, Computer Associates International in DOS/VSE and VM Software in VM.

DOS/VSE is the largest segment of the utility market from an operating system standpoint, but is growing at just 5% per year. DOS/VSE is aimed at small- to medium-size companies that are not focused on the leading edge of IBM technology. IBM urges these users to migrate to MVS, but will continue to support and enhance DOS/VSE for some time. In fact, IBM recently moved DOS/VSE development to Poughkeepsie, N.Y., perhaps indicating increased strategic priority. Computer Associates International is by far the market leader here and will attempt to leverage its base of 15,000 sites with applications and data base products. Uccel recently acquired Corodale Systems, marking its first entry into the DOS arena; however, it could face tough competition from Computer Associates International.

The MVS segment of the utility market has been the traditional stronghold of Uccel, although Computer Associates International has made significant inroads in the past two years. Both will have generated roughly $65 million of MVS utility software revenues in 1985. Computer Associates International continues to take an aggressive product stance with the introduction of Uni-Center/MVS, an integrated multifunction product that boasts 50 sites to date. Uccel has countered with the announcement of its next generation Nova series, but only limited products are now available.

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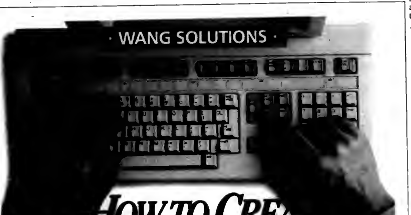
> *Users must experiment with new development strategies to cope with the applications backlogs of the future.*

With growth at 35% per year, the VM environment is IBM's fastest growing operating system. VM Software has had free run of this market for several years and has used the time wisely, cultivating a broad, well-integrated product line, large customer base and strategic alliance with IBM. We expect Computer Associates International to step up its competitive activities in the first quarter 1986 with the announcement of Uni-Center/VM. Uccel should follow in 1987. We suspect that VM market growth could slow somewhat if economic pressures persist.

The long-term requirement for the health of the entire software market is the introduction and widespread use of vastly improved software development technologies. All software vendors including IBM must appropriate these technologies in order to enhance their ability to customize and support their product offerings, thereby achieving greater economics of scale. Today, users must experiment with new development strategies in order to cope with the applications backlogs of the future. Will the answers arise from artificial intelligence technology? How about Star Wars/Ada trickle down? Are SQL and relational technology our panaceas? Stay tuned. ◪

Braude is vice-president of software management strategies at Gartner Group, Stamford, Conn.

Smith is vice-president of Gartner Securities Corp., Stamford, Conn., specializing in software and services.



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Data Bases Move In

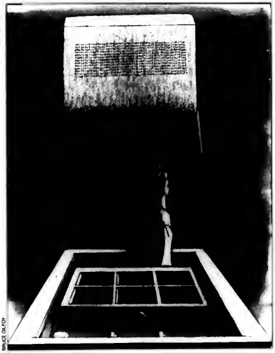
BY ERIK MORTENSEN

During the past few years, office automation has gradually, but conclusively, changed from the technology-driven concepts of the late 1970s and early 1980s into an information-based, multifunctional and user-oriented office environment.

Timely and complete information is an important strategic resource in the organization and the key to success in business operations. Executives are starting to realize that information is a resource just like any other capital asset.

The prime mover in the world of information processing today is software, not hardware technology. It is reflected in a call for customized corporate solutions in office automation and a growing demand for software integration into comprehensive office systems. However, there are important organizational hurdles to overcome.

U.S. businesses are investing less in office systems today than only a few years ago. Many business people are questioning whether large investments in office systems do, indeed, translate into measurable gains in productivity and effectiveness of business.


BRUCE GILFOY

One question is whether, in fact, companies may not have automated the wrong people by focusing essentially on secretarial and support personnel. This was certainly the predominant trend during the 1970s and the early 1980s, and it is still so in many companies. The real benefit in office automation comes from automating certain core functions of managers and professional staff who are making much larger salaries and who represent about 75% of the total salary cost of most organizations.

A recent joint study on "Measurement of Office System Use" by IBM and the University of Colorado at IBM's Harrison site provides hard data supporting the thesis that the real impact of advanced office systems is best realized by giving these tools to managers and professional personnel. This presupposes, of course, that they actually make proper use of the equipment, a fact that is far from evident today. The joint study therefore focused on questions such as: What motivates managers and business professionals to use office systems? How do managers and business professionals use office systems? And, how can the effectiveness of office systems be measured?

On-line information retrieval is a well-defined and established universe, which has been available to the public for close to 15 years. However, tapping these external data sources has, until recently, been in the hands of specially trained librarians or on-line professionals and services.

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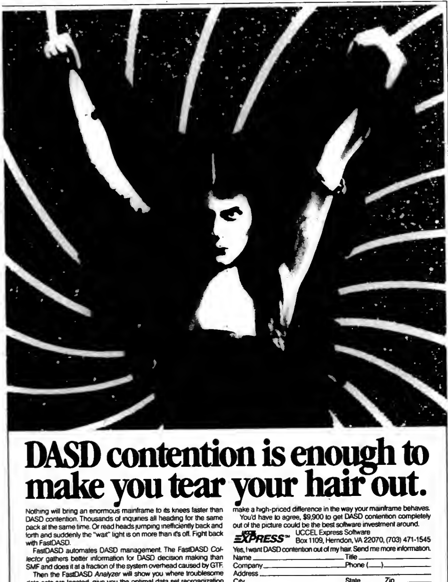
> *'At a certain point in the development of every technology, the customers take over and teach the designers; that moment is nearly at hand for the technology of on-line services.'*
>
> **— Information Industry Association**

Although information retrieval is performed in many major companies, the majority of corporate managers and professional workers are not sufficiently aware of the potential value of such information sources as part of their decision making. In their minds, a data base is generally equated with corporate in-house information systems rather than with external information vendor systems.

In the information industry — the publisher and vendors of various kinds of on-line information sources and services — sales are presently increasing at a steady annual rate. There are many more customers making use of these services than ever before. However, this industry is also changing fundamentally, according to the Information Industry Association (IIA): "If there were 300,000 information specialists in the country in 1983, there are three million potential information executives — market researchers, planners, product development managers, financial and legal professionals, investment analysts and chief executive officers who are now stumbling along on secondhand information and gut feel. Very little is known about this market. Information companies are still learning what those potential users want and how to sell to them — how the information management organization will evolve. But at a certain point in the development of every technology, the customers take over and teach the designers; that moment is nearly at hand for on-line services." Judging from this IIA assessment, we can expect a large and rapidly growing new end-user group that is interested in accessing external data sources as part of their daily office routines.

Jack Simpson, president of Mead Data Central, made the following statement about pending changes in the information industry at the Infor'84 Information Management Conference and Exposition. "The information explosion dictates our lives, now that managers spend 80% of their day managing information. We want to use information to do our jobs more productively and more effectively . . . to make the right decisions sooner and to reduce risk when we take action. These needs represent challenges to all of us in the information industry — you the consumer of office automation tools and we the suppliers of hardware, software and electronic information. No single company can do it all. All we can do is offer together a range of solutions."



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There are literally hundreds of bibliographic and numerical/statistical data bases of value to business managers in their daily work. This form of electronic publishing puts managers — wherever they are — in immediate contact with highly targeted information. For example, Information Services, Inc.'s Dialog provides access to more than 60 different proprietary data bases in the field of business and economics alone with many millions of records. Dialog's business/economics data bases are divided into four major subgroups: company and financial; industry specific; market research, industry, management data bases; and statistical/demographic data.

Trinet, a subsidiary of Control Data Corp., provides access to detailed information on over 450,000 business establishments with 20 employees or more. These establishments represent more than 85% of all industrial sales in the U.S. Trinet also offers industry-specific data, useful for a broad range of marketing decision makers. The data base, available through Dialog and updated on a quarterly basis, makes it possible for a manager to identify and clarify sales prospects by industry, company and establishment. Potential customers can be identified and sorted by state, county and zip code, ranging from the highest potential prospects to the lowest. Sales personnel can therefore be guided primarily to high-potential, high-volume prospects.

Managers working with applications programs such as Lotus Development Corp.'s 1-2-3 and Symphony can tap important numeric information from Data Resources, Inc. (DRI), a subsidiary of McGraw-Hill. DRI offers both historical and forecast data to clarify the past, define the present and anticipate the future. The desired data can be downloaded to a personal computer fully compatible with 1-2-3. In contrast to Dialog, which provides essentially "as reported" information, DRI adds a considerable amount of analysis to the actual data.

The DRI-type of data is particularly valuable, for example, when a chief executive officer sets a new financial target and operating management must respond with a plan that involves a shift in direction. For example: how will recession affect our sales? If we increase our prices next year, what will be the likely impact on market share?

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Dun's Marketing Service also offers the D&B Million Dollar Directory with 115,000 records containing comprehensive business information about companies with a net worth of $500,000 or more, including hard-to-find information on businesses that are privately held. These business establishments, which account for over $1 trillion in annual sales, are listed with full address, annual sales and number of employees. The file also provides the names of individuals holding positions in as many as 25 executive function areas.

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directory listings, sales volume and marketing data and references to parent companies for almost 500,000 non-U.S. companies in 133 countries. The service offers information that includes corporate names, addresses, annual sales, number of employees, type of company and so on.

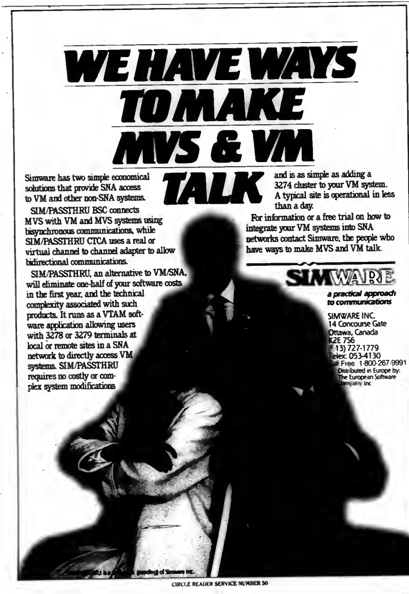
Searches in D&B can be coupled with searches in Moody's Corporate Profiles, which is a fairly new data base, providing descriptive and financial information on many publicly-held U.S. companies. The file covers all companies on the New York and American Stock Exchanges, and approximately 1,300 of the most active, emerging companies traded over the counter. It provides narrative descriptions of the most essential company information plus five-year financial key statistics. It also includes analyses of more than 900 companies of high investor interest in terms of quarterly earnings, dividends and recent corporate developments.

Finally, Disclosure contains public corporate ownership information on publicly-traded companies. This information is derived from required corporate filings made with the Securities and Exchange Commission (SEC). This type of information can be crucial to business negotiation and decision making where the latest public corporate information is required.

Fortune (Feb. 4, 1985) in "Life Will Be Different When We're All On-Line," describes still another corporate financial reporting system that will introduce a totally new dimension in financial disclosures: "The SEC is developing an on-line data base that is very much intended to affect transactions. Its EDGAR [Electronic Data Gathering, Analysis and Retrieval] project has been experimenting with procedures for putting all required financial disclosures on-line; more than 100 companies have been transmitting reports to the SEC electronically in recent months. Within two years the commission hopes to have all public-record filings accessible by computer. Any investor with even a modest home computer will be able to call up any financial report. An SEC statement this fall solemnly cited a survey in which 32% of individual investors said they expected Edgar to improve their financial performance."

These are just a few examples of the many different on-line information systems that are readily available today. The challenge is to introduce the concept of on-line information retrieval to business managers and professionals in such a way as to gain acceptance and proper use. The problem is therefore not one of technology, but one of education. This type of literacy training has certain unique elements that set it apart from, say, learning to program in Basic.

One essential element in computer literacy is to know how to select the right computer system, the correct modem for communication and other hardware dimensions of a system. In addition, computer users need, above all, assistance with practical applications



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and procedures. Likewise, when it comes to accessing external data sources, managers need to learn more than the technical dimensions of computers.

Media literacy, with respect to accessing external data sources, is the knowledge of where to locate desired information. Should a manager look for information in Dialog and its more than 200 data sources of different origin and sponsorship or turn to a full-text data system? Maybe there is a need for specialized information systems such as Dun & Bradstreet, Dow Jones News or Data Resources with its large and broad range of numerical business data? Or maybe the manager would need access to several of those services, as many firms do?

Knowledge of the difference as well as complementary relationship between these on-line services is essential in setting up an effective corporate information retrieval system. There are also cost factors that are important to consider.

Data base users must know how to formulate a proper search query that can be understood by the computer system being accessed. Information retrieval from on-line data bases is a highly interactive function that the data processing/MIS manager can most effectively handle personally.

Managers should also be aware that the concept of information literacy is a complex one, dealing with essentially intangible and intellectual activities that are not easily explained in procedural manuals and handbooks. Although personal computers are getting increasingly user-friendly through the use of different kinds of menu systems and prompts, on-line data bases are not particularly user-friendly. If a searcher formulates a query in a wrong or incomplete fashion, there is no feedback providing evidence of this fact. The inexperienced searcher can easily go astray and end up with inaccurate or misleading information. If the full potential of a rapidly expanding and global information industry is to be realized, corporate end user searching must become part of the integrated electronic office.

The prime mover in the world of information processing today is undoubtedly software, not hardware technology. This trend is reflected in a call for specific customized applications in office automation and a growing demand for transparent integration of software programs into comprehensive electronic office systems. There is thus a rather distinctive move away from third-party software vendors in the direction of integrated tool kits for all in-house applications, including on-line information retrieval.

> ”
>
> *If the full potential of a rapidly expanding and global information industry is to be realized, corporate end user searching must become part of the integrated electronic office.*

Although searching external data sources will probably never become truly user-friendly in the sense of providing the inexperienced end user with perfect solutions to complex information problems, there are new software tools that, at the least, make information retrieval efforts user-transparent. There are micro software packages providing automatic dial-up and logon to external data systems

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ON-LINE INNOVATIONS

via public access communications networks such as Tymnet, Inc.'s Tymnet and GTE Telenet Communications Corp.'s Telenet. Search strategies can be created off-line and uploaded into the system when the user is ready to go on-line. Other software packages assist end users in downloading and postprocessing on-line information. These various personal computer-based programs assure greater ease in accessing external data sources and reduced search costs.

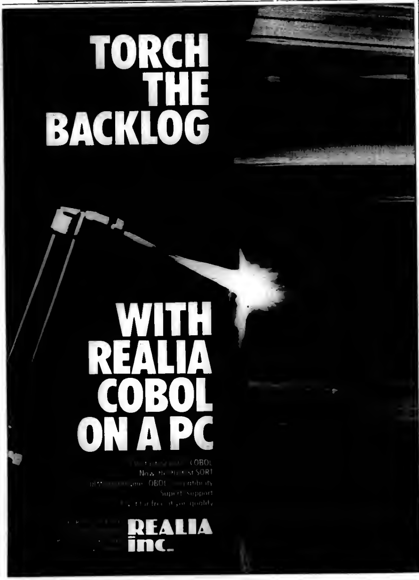
Integrated office software systems are also available for minicomputer office systems such as Digital Equipment Corp.'s All-In-1, Data General Corp.'s Comprehensive Electronic Office (CEO), Wang Laboratories, Inc.'s Office and IBM's Profs. These systems offer a wide selection of basic office functions such as word processing, dictionaries, calendars, electronic mail, voice mail, data base management, electronic spreadsheets as well as front ends to external data sources. Vertical software thus makes it possible for end users to move between different applications with relative ease and speed. Such total networking provides end users with tightly integrated office automation tools that can be tailored to meet unique corporate requirements. Integrated office systems can also provide cost-efficient customized application software packages for specific businesses such as health care, banking or law.

DEC's Team Software provides automatic linkage between two computers, thus making it possible to integrate personal computers with external data sources. In the future, coupled with expert system programming (or artificial intelligence), according to DEC's Jack Gilmore, "we will see procedures that will routinely access other computers and their data bases and perform tasks that up to now would have to be executed by expert operators and professional, scientific and business-oriented people."

> ”
>
> *These various personal computer programs assure greater ease in accessing external data and reduced search costs.*

This move toward integrated office systems software is not limited to the U.S. For example, Volvo-Ericsson's (a joint venture between Volvo North America Corp. and L.M. Ericsson of Sweden) functional electronic mail system Memo has become a de facto standard for electronic mail systems in northern Europe with more than 45 installations in Sweden, England, West Germany, Belgium and Holland. Its Dialout software system provides a user-friendly front end for external data base vendors, permitting automatic dail-up and logon as part of its total management system. The integration between Dialout, Memo and Disoss enables data files to be transferred to dedicated word processors for postprocessing. Such editing procedures can be important because retrieved information often cannot be used without modification or transformation. For example, an end user wants to incorporate statistical data into a spreadsheet analysis or sales information into a relational data base. Data files can also be reformatted conveniently for inclusion in reports. ■

Mortensen is information services specialist, J.P. Stevens & Co., Inc., New York City and an adjunct assistant professor of information systems at The Information Technologies Institute, School of Continuing Education, New York University.



SQL: A New Standard

· BY · JERRY · BAKER ·

GEOFF O'CONNELL

In February 1985, the American National Standards Institute (ANSI) Data Base subcommittee, X3H2, unanimously approved Structured Query Language (SQL) as the standard language for relational data base management systems (DBMS). After a successful public review, the proposal was approved by the ANSI Committee on Computers and Information Processing, X3. Final ANSI approval for the standard is expected early this year.

SQL is the fourth-generation, IBM-developed relational data base language that forms the basis of products such as IBM's SQL/DS and DB2 and Oracle Corp.'s Oracle, for example. As the standard language for relational DBMS, SQL promises to have a profound effect upon the MIS landscape. It will become the most portable and most widely used data base language and form the basis for many sophisticated data base tools and applications. Relational products not offering an SQL interface will be forced to adapt or face the prospect of losing significant market share in this highly competitive area.

Three basic varieties of DBMS dominate the commercial marketplace today: hierarchical, network and relational.

In a hierarchical DBMS the users' view of data is that of a tree structured hierarchy. A traditional corporate organization is an example of such a hierarchical structure. Typically the relationships between data items are restricted in such a way that each node in the tree can have one or more child nodes underneath it, but only a single parent node above it.

In a network system the structure of the data is allowed to be more complex. Arbitrary relationships between the nodes in the network are allowed.

The data manipulation languages used in network and hierarchicial systems are typically procedural. It is necessary, for example, for the user to navigate through the hierarchy or network to access the desired data. Moreover, because data relationships are often implemented directly by access paths to the data it can be

STANDARDS UPDATE

frequently necessary for the user to have a detailed understanding of exactly how the data is stored and maintained.

Users of relational systems, on the other hand, see data in the form of simple two-dimensional tables. Unlike typical hierarchical and network systems, the relational model provides a clear separation between how the data is viewed by the user and how the data is stored and accessed.

Thus, relational systems provide an automatic navigational capability. Many such systems also perform complex query optimization. That is, they determine which combination of access paths can be used to satisfy a query at minimum cost. This again simplifies the task of the application developer.

Employees

Emp. No.	Name	Job	Salary	Dept No.
1746	Smith	Clerk	$2500	247
3896	Clark	Director	$4500	100
1245	Jones	President	$5010	520
8335	Wilson	Manager	$3500	450

Figure 1. Relational Model Data Table

SQL provides benefits in addition to those inherent in the relational model. Because it is nonprocedural the user need only specify what data is desired and not worry about how the data is to be accessed. It has an English-like syntax that is easy for the novice user to learn quickly. Moreover, the language contains powerful built-in operators for combining data from different tables or grouping data according to common attributes.

One of the most useful features of SQL is that it can be used as a stand-alone, ad hoc query language and can also be embedded into traditional programming languages such as Cobol and Fortran. This power and versatility results in significant productivity gains over traditional network and hierarchical data base languages.

Finally, and perhaps most importantly, SQL is portable across a wide range of heterogeneous hardware and operating systems.

In the relational model, data is represented in the form of tables consisting of simple rows and columns. Each table contains data about a particular collection of items of interest. For example, a table could contain data about the employees of a company. Each column in the table could represents an attribute of the company employees, while each row would represent information about a particular employee (see Figure 1).

SQL provides a high-level, nonprocedural way to create, access and modify data. For example, to create the employees table, a simple CREATE TABLE statement is used (see Figure 2, Page 58).

The user need specify only the name of the table and the names and data types of the columns.

Using the SQL SELECT statement, data can be easily retrieved. To identify those employees whose salary is greater than $2,000, for example, the following query would be used (see Figure 3, Page 58).

In a similar manner, data can be modifed using UPDATE, INSERT or DELETE statements.

In addition to the simple concepts illustrated here, SQL provides much more sophisticated processing power by allowing the user to order, group and join data from multiple tables in arbitrary ways. Powerful data control and security mechanisms are also an integral part of the language.

The relational model has its roots at the IBM San Jose Research Center in San Jose, Calif. It was there that former IBM researcher E.F. Codd, acknowledged as the founder of the relational data base, developed a new model for viewing data in the forms of relations or tables.

The advantages of such a model, Codd asserted, were its simplicity, its powerful operators and its basis in formal mathematical theory. He presented these ideas in a paper called "The Relational Model for Shared Data Banks."

While the paper aroused much interest in the academic community, there was, nevertheless, considerable skepticism. Many thought that although the concepts were theoretically interesting, they were not suitable for use in a commercial data base product.

In 1972, IBM began work at the San Jose Research Center to determine whether a successful implementation of the relational model based upon Codd's theory could be developed. The result was the first full-function relational prototype called System R. Many of the concepts such as views, query optimization, query compilation and various recovery management techniques widely used in

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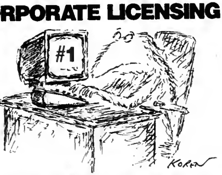

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today's relational products were developed in this project.

An important part of the System R project was the development of a new, user-friendly query language called Sequel2. The specifications of this language became the basis for the SQL used in today's commercial products.

Other research-oriented institutions soon followed IBM's lead and began conducting research into relational theory and the design of relational systems. The University of Toronto, University of California at Berkeley and University of Utah all made significant contributions in this area.

While the System R project and others like it were successful in demonstrating relational prototypes, the concept was still not widely embraced by the major computer corporations including IBM until several years later. In fact, it was not until 1982 that IBM released its first full relational product, SQL/DS, which was designed for the DOS environment. In 1983, the second version of this product was released for the VM marketplace. Finally, in 1984, IBM released its long-awaited MVS-based relational system, DB2.

Other competitors of IBM were not so slow to use this technology in the marketplace. Larry Ellison and Robert Miner of Oracle Corp. (then called RSI) used the IBM blueprints to develop the first commercially available, full-function relational DBMS in 1979, more than three years before IBM released SQL/DS.

In the following years, many other companies jumped on the SQL bandwagon with relational or relational-like products for various kinds of machines and operating systems. Included among these are DG/SQL marketed by Data General Corp., the Unify system marketed by Unify, Inc. and Informix-SQL marketed by Relational Database Systems, Inc. Because a full-function relational system takes years to develop, however, many of the newcomers provide only subsets of the language implemented by IBM and Oracle and, moreover, operate on a narrow range of equipment.

The X3H2 subcommittee has been developing a language standard for relational systems since 1982. Organizations represented on the committee include IBM, Oracle, the National Bureau of Standards, Digital Equipment Corp., Control Data Corp., the National Security Agency, Data General Corp., General Electric Co., Sperry Corp. and Hewlett-Packard Co.

After the subcommittee's acceptance of the SQL standard in February 1985, the proposal was submitted for approval to the business and technical community. During this review period, the subcommittee reviewed and responded to concerns from the public about the standard. Most of the comments received stressed the need for functionality beyond that currently specified. While sympathetic to these concerns, the subcommittee was determined to defer any proposed extensions to the next version of the standard.

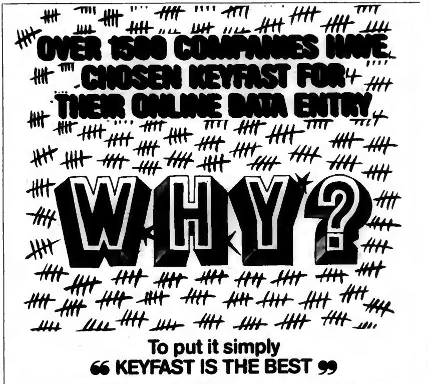
At the conclusion of the public review period, the standard was passed to X3H2's parent, the ANSI Committee on Computers and Information Processing. This committee approved the standard late last year. Official ANSI approval is expected early this year.

> ”
>
> *With the approval of SQL as a standard, the trend toward relational systems will gain increasing momentum. The use of SQL in developing data base applications has shown significant productivity gains over the use of more traditional data base languages.*

In addition to the ANSI process, the standard is being reviewed by the International Standards Organization (ISO). ISO approval is expected sometime this year at which point SQL will truly become the international standard language for relational data bases.

During this review process, the X3H2 subcommittee has been hard at work developing significant extensions to SQL. Among the new features being considered are an outer join capability, new data types such as date and time, referential integrity and user-defined functions. X3H2 approval for these extensions should come in early 1987. Later it is expected that ANSI will begin standardization efforts for higher-level interfaces (such as application generators) and also begin work in the distributed data base area.

With the approval of SQL as a data base standard, the trend toward relational systems will gain increasing momentum. The use of SQL in developing data base applications has shown significant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productivity gains over the use of more traditional data base languages. Moreover, it can be expected that even more sophisticated productivity enhancement tools will be developed using SQL as the base.

In the near future it can be expected that SQL will serve as the base for even more sophisticated applications such as Computer-Aided Engineering (CAE) systems and expert systems.

As an added benefit, developers using SQL for their applications can be assured that their work is highly portable. Such portability will become increasingly important to companies that want to share data and programs among various machines. The trend toward distribution networks (often with heterogenous hardware and operating systems) will make this portability even more important.

Many have claimed that relational systems because of performance limitations will only penetrate a narrow spectrum of the data base marketplace. While it is true that today's commercial hierarchical and network systems generally offer higher performance than commercial relational systems, it must be remembered that relational technology is relatively new. Current research in the performance area will significantly narrow this performance gap within the next few years. Certainly within five years the technology will have improved to the point where relational systems will be the choice for even the most performance critical applications.

There is little question that in the next several years relational systems will become the dominant force in the DBMS marketplace. Companies that market nonrelational products will find themselves losing market share unless they develop a relational capability. Adding such a capability to an existing nonrelational system, however, is technically complex and likely to yield an unsatisfactory result. Of course, some nonrelational products like IBM's IMS will linger simply because of the tremendous dollar investment made by customers in training and application software. Others will fade very quickly unless a relational capability is added.

The popularity of relational systems indicate that the relational DBMS is here to stay. The standardization of SQL will hasten the movement to this technology. This is good news for the MIS world as it will result in significant productivity gains and increasingly sophisticated and portable data base tools and applications. ◼

Baker is director of Unix Development with Oracle Corp. ond o member of the ANSI SQL committee.

The opinions expressed in this article are entirely those of the author ond do not necessarily reflect the views of Oracle Corp., the Americon Notional Stondords Institute (ANSI), or the ANSI X3H2 subcommittee.

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>
> *In the near future, SQL will serve as the base for even more sophisticated applications such as Computer-Aided Engineering systems and expert systems. As an added benefit, developers using SQL for their applications can be assured that their work is highly portable.*

CREATE TABLE	
Emp. No.	Integer
Name	Char(15)
Job	Char(10)
Salary	Decimal(6,20)
Dept No.	Char(3)

Figure 2. CREATE TABLE

```
SELECT   Name, Salary
From     Employees
Where    Salary > 2000
```

Figure 3. SELECT Statement

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LETTERS

3270 Emulation

The November 20, 1985 issue of *Computerworld Focus* contains an article entitled "3270 Emulation: Vendors Bail the Hook." There are a few points I would like to clarify.

On page 31, the article implies that Digital Communications Associates, Inc. (DCA) and Techland Systems, Inc. are the leading players in the 3270 micro-to-mainframe market. Market researchers International Data Corp. (IDC) and Future Computing, Inc. among others estimate that DCA currently holds about 40% of the market, IBM has between 15% and 20% and both CXI, Inc. and Forte Data Systems, Inc. have 15%. Techland Systems is among the other companies comprising the remainder.

The article goes on to say that "even with the presence of DCA and Techland Systems, companies have swarmed into the emulation board market." Many of those swarming companies provide technologically superior products and high-quality customer service. In fact, to date a terminal emulation product offered by Techland Systems, AST Research, Inc. and others is manufactured by CXI.

The article also takes a somewhat narrow view of the choices open to customers. It may be that the software company used by the New Hampshire Insurance Group only supported CXI's Applications Program Interface (API). However, major software developers such as Cincom Systems, Inc., Cullinet Software, Inc., and Performance Software, Inc. support a multiple of micro-to-mainframe APIs, including CXI's. The implication that CXI's products are used because they are the only ones supported by a particular software company is misleading.

Charles Morel

CXI, Inc.
Palo Alto, Calif.

Focus Is Fine

Let me express my admiration for a fine magazine — *Computerworld Focus*. Each issue has something of interest and value for me as a software professional.

Jim Brown

Ypsilanti, Michigan

ISSUES AND ANSWERS from page 6

• Languages: The predominant language for the types of applications organizations are the most familiar with is Cobol. Cobol has demonstrated its flexibility by adapting to the development of on-line screen processing as well as to interfaces with various data base management facilities. Still, applications development using Cobol is very time-consuming, risky and expensive. Perhaps the most serious challenge to Cobol in recent years has come from fourth-generation language products. While it is probably too soon to tell what their real value will be, it is clear they have established themselves as alternatives to Cobol in some situations.

• Development/Package Implementation: One method of developing application software has been to purchase an application software package and either modify internal policies and procedures to match the new system or tailor the package to match the way the organization does business. Quality assurance programs should be used in system development to avoid problems.

• Methodologies: The early years of commercial data processing saw many attempts and spectacular failures of development. In response, computer applications have been written that automate the system development life cycle, allowing the system developer to incorporate the methodology used in development. This has caused a resurgence of interest in system development methodologies.

• Programmer Productivity and Systems Life Expectancy: Recent years have seen the development of many software tools that help to make the developer of application software more productive.

Those responsible for satisfying user needs with applications software must take account of these trends as they plan to meet the challenges of today and tomorrow.

Gilges is partner in charge, information systems services consulting, at Peat, Marwick, Mitchell & Co. in New York City.

MANAGER'S CORNER from page 9

controls, risk avoidance and communications are properly evaluated. Value analysis will help make the proper decisions. Be sure not to establish convoluted procedures that are designed to catch obscure exceptions.

To make this work, a critical prerequisite is experienced, capable project leaders who can rise to the challenge of decision making and flexibility. Rely on their skill of judgement to reduce project time and introduce innovation.

An obvious but mandatory element is management sponsorship of this procedure. If they can be convinced of the potential payback from these efforts, they will be your most enthusiastic promoters.

Once underway, this cleanup should yield other benefits also. No longer will voluminous guidebooks need to be maintained. No longer will the rules have to be continually changed to apply to new circumstances. No longer will you need to teach these arcane steps to fledgling project leaders. No longer will there be extra overhead on data processing staff due to unnecessary involvement. However, you must be clear in your mission. Remember, whether revamping your software development procedures or producing your first, keep it simple

Young is MIS director and responsible for user technology at a major Massachusetts manufacturing firm. He has worked in the industry for 15 years.

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CIRCLE READER SERVICE NUMBER 92

Survey: Data Processing Budget Increase Expected

Corporate data processing budgets for 1986 are expected to increase by an average of 6% over 1985, according to a survey of 180 commercial MIS data processing managers, government computer users and hardware manufacturers, conducted by International Data Corp. (IDC), a Framingham, Mass., market research firm.

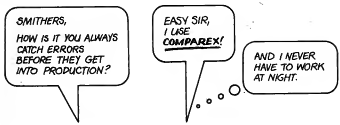
Participants in the survey rated high level end-user query languages, data dictionaries, personal computer site licensing, data administration, relational data base management systems (DBMS) and multivendor query standardization as technologies particularly important to them.

The executive survey also found the following: Most companies placed communication management under very centralized control, and most companies are aiming at standardizing on communications with IBM's Systems Network Architecture (SNA) for 1987 and SNA's LU 6.2 communications protocol for 1989. The survey also found that most companies are intending to install a corporatewide information center by 1988, and there is a trend toward end user independence with departmental systems.

Among the more negative thoughts culled from the survey are: Apple Computer, Inc.'s inability to be a major factor in the office automation market, a general feeling that AT&T will never be a leader in computers and the opinion that true micro-to-mainframe links do not exist.

Other information coming out of IDC has worldwide packaged software revenues growing beyond 30% annually for the next several years, with 1985 program revenues topping an estimated $4 billion. IDC also predicted that worldwide shipments of microcomputer-based local-area networks will grow at nearly a 40% rate compounded annually through 1990, while shipments of terminal/systems-based local-area networks will increase at a 22% rate.

Worldwide, Unix-based shipments numbered 160,000, while the U.S. share of this market is expected to increase from 70% in 1985 to 79% through 1986.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CIRCLE READER SERVICE NUMBER 56

User Software Marketing Needed

User-supported software has been around for a couple of years now, but those dreaming of making millions in the field might be advised to hone certain business and marketing skills before taking their product to market.

Though user-supported software bypasses many usual channels of software marketing such as retail outlets, instead relying primarily on donations from users, it is just as essential to concentrate on advertising and support as the large software publishing houses, according to Bob Wallace, president of Quicksoft, the Seattle, Wash., producer of PC-Write, one of the most successful user-supported programs on the market today.

Wallace said user-supported software, if handled properly, can be an effective way of introducing to users a product that might otherwise die quickly or never even get into traditional marketing channels.

"User-supported software offers many pluses for both the producer and users," Wallace explained. "It avoids much of the overhead of software publishing while making software less expensive for end users. It can reward authors directly for their work and can build a reputation for the author of the program that can help gain entry into the commercial market. What you need is exposure for your product by going to user groups, trade shows and publishers."

The pitfalls are also there. Wallace said some authors can get into trouble right away by asking for unrealistic donations for their product from users. Others might introduce a product into a market already saturated with similar products. There is also the danger that a program could have short-lived success, fading from lack of adequate documentation and follow-up enhancements from the producer.

"I can't stress how important this follow-up support is," Wallace said. "Users expect a product to be improved over time. If you do that, you'll be rewarded. If they feel they're being left hanging, they'll go somewhere else."

Wallace is a case study in user-supported software success. In 1983, Wallace introduced PC-Write, a word processing package for IBM Personal Computers. Periodically enhancing the product during the past three years, Wallace has built a dedicated, registered user base of over 7,500, with estimated 1985 sales of $750,000, aiming to top $1 million in 1986.

IBM Unveils RISC RT Personal Computer Line

IBM RT Personal Computer 6151 Model 10

RYE BROOK, N.Y. — IBM unveiled the RT Personal Computer line of high-speed, 32-bit workstations, the company's first to be based on its Reduced Instruction Set Computer (RISC) architecture.

The units contain a new IBM-developed, 32-bit microprocessor chip with RISC's simplified instructions etched on it. The chip along with a new IBM virtual memory management chip allows the RT PC to handle data at the high speeds required for complex technical applications.

The operating system for the RT PC — Advanced Interactive Executive (AIX) — combines the multiuser, multitasking features of Unix with IBM-developed enhancements such as ease-of-use and virtual memory features, according to the vendor. Along with the new operating system, IBM announced 10 optional system packages including:

RT PC SQL/RT Data Base: This package is a relational data base management system, compatible with SQL/Data System (DS) and Data Base 2. It sells for $1,000 and will be available in March.

RT PC Data Management Services: This can be used to create and change files and directories, and multiple users can automatically share data at the same time. The package costs $500 and will be available in March.

RT PC Personal graPHIGS: This is a high-level application programming interface with more than 250 graphics functions. It is compatible with the recently announced host-based IBM GDDM/graPHIGS programs. It sells for $1,000 and will be available in the second quarter 1986.

RT PC Personal Computer AT Coprocessor Services: This package permits users to run, without modification, many PC AT programs, according to the vendor. It costs $550 and will be available in March.

RT PC 3278/79 Emulation: This will allow RT PCs to function as terminals linked to large computer interactive applications such as Profs and SQL/DS. Available in March, the product sells for $500.

RT PC INmail/INnet/File Transfer Program: It permits RT PC users to share messages and data files with other RT PCs, PCs with the PC/IX operating system and large computers with IX/370. Available in March, the product costs $625.

RT PC Professional Graphics Series: This is a set of four programs compatible with the IBM PC Professional Graphics Series. The four packages range in price from $600 to $700 and will be available in March.

RT PC Fortran 77, IBM RT PC Basic Interpreter and Compiler and IBM RT PC Pascal: These are three optional programming languages. Available in March, Fortran 77 costs $650 while Basic and Pascal are each $1,000. Assembler and C Compiler are standard with the AIX operating System.

In addition to the above, Applix Integrated Applications' Applix IA, Samna Corp. Samna Plus and TLB Inc. Accounting Package including Solomon III and RS/1 run on all RT PC models and can be shared by up to eight concurrent users.

For more information, contact IBM, Information Systems Group, 900 King St., Rye Brook, N.Y. 10573.

Circle Reader Service Number 213

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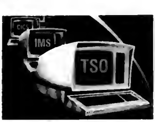

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CIRCLE READER SERVICE NUMBER 93

HP Software Enhancements Debut

PALO ALTO, Calif. — HP Officeconnect-to-Profs and HP Convert/DCA are two new products introduced by Hewlett-Packard Co. aimed at enhancing the company's Personal Productivity office system.

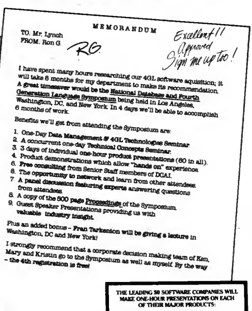
HP Officeconnect-to-Profs, according to the vendor, allows a Personal Productivity Center network to be integrated with an IBM Professional Office System (Profs) mainframe environment, supporting two-way conversion of electronic mail documents between the Profs address format and the address format of HP Deskmanager. HP Officeconnect-to-Profs also enables HP Deskmanager users to share word processing documents. Through an electronic mail conversion facility these documents are received by Profs users as notes. Additionally, the company said that documents from these software products can be combined into a single HP Deskmanager message and sent to a Profs user as a note. This provides an electronic mail link between the two systems.

HP Convert/DCA performs two-way document conversion and exchange between HP WP formats and IBM Revisable Form Text Document Content Architecture (DCA) WP formats, including HP Word and Advancedwrite WP software and IBM Displaywrite 2, the vendor said.

HP Officeconnect-to-Profs costs $27,500, and a right-to-copy option is available for $19,250. HP Convert/DCA costs $1,600 for the HP Series 37 computer system and $4,000 for all other HP 3000 computer systems. Contact Hewlett-Packard Co., 3000 Hanover St., Palo Alto, Calif. 94304.

Circle Reader Service Number 214

National Database &
4th Generation Language Symposium



MEMORANDUM

TO. Mr. Lynch
FROM. Ron G. R.G.

Excellent!!
Approved
Sign me up too!

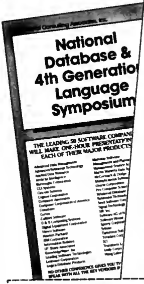
I have spent many hours researching our 4GL software aquisition; it will take 8 months for my department to make its recommendation. A great timesaver would be the National Database and Fourth Generation Language Symposium being held in Los Angeles, Washington, DC, and New York. In 4 days we'll be able to accomplish 6 months of work.

Benefits we'll get from attending the Symposium are:

1. One-Day Data Management & 4GL Technologies Seminar
2. A concurrent one-day Technical Concepts Seminar.
3. 3 days of individual one-hour product presentations (60 in all).
4. Product demonstrations which allow "hands on" experience
6. Free consulting from Senior Staff members of DCAI.
8. The opportunity to network and learn from other attendees
7. A panel discussion featuring experts answering questions from attendees.
8. A copy of the 500 page Proceedings of the Symposium.
9. Guest Speaker Presentations providing us with valuable industry insight.

Plus an added bonus – Fran Tarkenton will be giving a lecture in Washington, DC and New York!

I strongly recommend that a corporate decision making team of Ken, Mary and Kristin go to the Symposium as well as myself. By the way – the 4th registration is free!



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CIRCLE READER SERVICE NUMBER 96

Cluster Software Offered

COSTA MESA, Calif. — Emulex Corp. has introduced an SNA Cluster software/hardware package that provides Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) interactive communications and high-performance batch processing. According to the vendor, the package allows a user to cluster up to four IBM Personal Computers and attached printers. Each PC can emulate either a 3270 display station including full-printer support or a 3770 RJE workstation.

Of particular interest in the Emulex SNA Cluster is the Distributed Communications Processor (DCP)-88/VM. This is a communications coprocessor that utilizes a single PC slot to support up to four synchronous lines and a high-speed printer port.

Emulex's SNA cluster software allows PCs to operate on SNA networks using 3270 and 3770 emulations without adding or changing host application software. The user can also run 3270 emulation on one or more PCs in the cluster concurrently with RJE (3770) emulation on other PCs in the same cluster, said the vendor.

The SNA Cluster package has a list price ranging from a low of $2,225 for a single-user system to a high of $3,550. Contact Emulex Corp:, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

Circle Reader Service Number 215

Syncsort Utility Announced

WOODCLIFF LAKE, N.J. — Syncsort, Inc. has announced Release 2.0 of Syback. Syback is Syncsort's backup, restore and copy utility used for VM systems.

Syback provides a full-screen facility with on-line help information. In addition, an automatic tape pool management facility reduces the operator intervention that may be required during the restore and backup process, according to the vendor.

Full-shop backups can be run with the product's menu-driven full-screen interface. A centralized restore utility is also provided for use with a disconnected machine.

Among the enhancements to the new version is the ability to copy variable-length CMS files along with fixed-length files. Also, Syback now supports 3270 display mode in stand-alone mode and can be instructed to back up only the permanent parts of a CP volume, said the vendor. Exit capabilities have also been expanded. According to the vendor, tape-handling facilities have also been improved.

Syback is priced at $9,000 for a three-year license, with multiple copy discounts available. For more information, contact Syncsort, Inc., 50 Tice Blvd., CN18, Woodcliff Lake, N.J. 07675.

Circle Reader Service Number 216

PRODUCTS

VAX Software Revisions Introduced By Digital Equipment Corp.

MARLBORO, Mass. — Digital Equipment Corp. has announced new versions of many of its VAX software packages. DEC also introduced VAX Information Architecture and engineering tools. New versions were announced for the following products: VAX DBMS Version 3.0, VAX Rdb/VMS Version 2.0, VAX ACMS Version 2.0, VAX CDD Version 3.2, VAX Datatrieve Version 3.3, VAX TDMS Version 1.5. The latest versions of the VAX Information Architecture software can be purchased individually and are available in three packages: Vaxinfo I, II and III.

Vaxinfo I consists of VAX CDD, VAX Datatrieve, VAX Rdb/VMS and VAX TDMS. It provides the software necessary for development of commercial applications. Vaxinfo II consists of VAX CDD, VAX Datatrieve, VAX TDMS, VAX ACMS and VAX Rdb/VMS. It adds transaction processing to the Vaxinfo I package, as well as the potential for distributed processing. Vaxinfo III consists of VAX CDD, VAX Datatrieve, VAX TDMS, VAX ACMS and VAX DBMS. It provides users with the support facilities of Vaxinfo II along with some features of a CODASYL data base, according to the vendor. In addition to full development packages, remote access and run-time Vaxinfo packages are available for users who want to distribute applications across a cluster or network.

DEC has also introduced Vaxset, a package composed of VAX Language-Sensitive Editor, VAX Performance and Coverage Analyzer, VAX DEC/Test Manager, VAX DEC/CMS and VAX DEC/MMS, all of which aid in implementing, testing and maintaining system software and application programs running under the VAX/VMS operating system. Another announcement, VNXset, is a collection of products that provide programmers with a Unix-type environment on the VAX/VMS operating system. Cost of licenses for the Vaxinfo packages range from $10,612 to $37,992, depending on the VAX computer system and configuration. Vaxset and VNXset are licensed from $13,850 and $9,115 respectively, to $34,620 and $22,785, respectively, depending on system and configuration. Contact Digital Equipment Corp., Maynard, Mass. 01754.

Circle Reader Service Number 217

SQL Spreadsheet Announced

MENLO PARK, Calif. — Oracle Corp. has announced a Lotus Development Corp. 1-2-3-compatible spreadsheet and integrated it with its Oracle relational data base management system.

SQL Calc, which runs identically on mainframes, minis and personal computers, allows users to put SQL commands into spreadsheet cells in the same way they enter formulas. When a SQL command for data retrieval is entered into a cell, information is automatically retrieved from the data base and placed into the spreadsheet. The product also permits users to modify the data base and create new tables directly from the spreadsheet. The vendor said SQL Calc is targeted at spreadsheet users who need data base capabilities, but still want the advantages of an integrated product.

SQL Calc is available immediately for the IBM PC XT and PC AT with a minimum of 512K bytes of memory and 2M bytes of hard disk storage. The vendor expects it will be available for IBM mainframes, other minis, superminis and most Unix systems during the first and second quarters 1986. SQL Calc is priced at $395. Contact Oracle Corp., 2710 Sand Hill Road, Menlo Park, Calif. 94025.

Circle Reader Service Number 218

TASC Blazes The Way

READING, Mass. — The Analytic Sciences Corp. (TASC) has introduced Trailblazer, the first product in its Cobol Renewal Series of productivity tools designed to reduce the time that systems analysts and programmers spend debugging and enhancing existing programs.

Trailblazer is a Cobol analyzer that understands programs and thinks of them in logical segments. Key features of Trailblazer are its ability to examine in logical segments rather than counting code by line execution, its ability to compare different versions of source code, identify which records in an input file result in a redundant test of program segment and reduce test run times by up to 75%, said the manufacturer.

Trailblazer, which is available immediately, runs on IBM 4300, 3080 and 3090 series mainframes and IBM-mainframe compatibles under both VM and MVS and costs $50,000 for the Testing Analyzer (including the Standard Routine Package) and the Change Analyzer.

For more information, contact TASC, 1 Jacob Way, Reading, Mass. 01867.

Circle Reader Service Number 219

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Human Resource Management That Helps Your Bottom Line

CIRCLE READER SERVICE NUMBER 86

Excelerator Enhanced

CAMBRIDGE, Mass. — XL/Design Integrator, a mainframe- and minicomputer-based product designed to extend the functionality of Excelerator, its software for systems analysis, design and documentation, was introduced by Index Technology Corp. XL/Design Integrator, when linked with Excelerator, extends the analytical and data sharing capabilities of the workstation software to aid systems analysis and design, the vendor said. The first version of XL/Design Integrator runs on VAX minis and includes the complete Excelerator dictionary: the full range of Excelerator analytical facilities including graph analysis reports, entity lists and a report writer; import/export and data sharing capabilities; document production and graph printing.

The VAX version of XL/Design Integrator operates in a standard VMS 4.1 or Micro-VMS environment. The license fee per CPU ranges from $10,000 to $35,000, depending on the hardware configuration. Contact Index Technology Corp., 5 Cambridge Center, Cambridge, Mass. 02142.

Circle Reader Service Number 220

Virtual Disk Communications Program Offered

PRINCETON, N.J. — Martin Marietta Data Systems' ITSoftware division has announced a new program for virtual disk communications offered as an option module to RunIT, ITSoftware's DOS shell and utilities program.

The RunIT Virtual Disk Utilities program option is used to create virtual disk drives from IBM Personal Computers, Personal Computer XTs, Personal Computer ATs or IBM PC-compatible computers on an IBM mainframe running VM/CMS or MVS/TSO operating systems. The Virtual Disk Utilities option is selected from the RunIT main menu to create or use virtual disks. Once created, the disks can be used by selecting from a pop-up menu that starts the session. RunIT works with IRMA, CXI Plus, Forte or IBM 3278/79 emulation boards or an asynchronous port with a Hayes Microcomputer Products, Inc. modem or Renex Corp. protocol converter.

According to the vendor, RunIT Virtual Disk Utilities can be used for sharing data among many personal computer users and to download corporate data files from the mainframe to the personal computer. Additionally, personal computer data files can be uploaded to the mainframe and an entire hard disk can be copied onto a virtual disk on the mainframe for archival purposes.

RunIT Virtual Disk Utilities module requires at least one disk drive and 128K bytes of random-access memory. The program runs with DOS 2.0 or later versions and is priced at $250 per personal computer plus a one-time charge for the mainframe ranging from $3,500 to $5,500 based on the standard IDC Rating Schedule and size of the CPU. For more information, contact Martin Marietta Data Systems, ITSoftware, P.O. Box 2392, Princeton, N.J. 08540.

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CIRCLE READER SERVICE NUMBER 91

New Xerox Software Debuts

NEW YORK, N.Y. — Xerox Corp. has announced six new or expanded modules in its Viewpoint and VP Series applications software for the Xerox 6085 professional computer systems and the Xerox 8010 Star information systems.

VP Tektronix 4014 Emulation module enables users to emulate the operation of that vendor's graphics terminal. The user can then link to IBM or Digital Equipment Corp. mainframes in order to access and edit engineering drawings.

Access to IBM hosts is expanded with VP 3270 1.1. This software module enables the user to emulate the IBM 3278 model 5 display terminal.

The enhanced VP Document Editor, VP 1.1, now features auto-hyphenation, table of contents creation, index creation and dot leadering.

Nine languages have been added to VP multilingual capability making it possible to create, store, transmit and print documents in more than 30 foreign languages. The VP Automated Workstation enhances workstation users' and workgroups' productivity by automating workflow processes and business procedures.

In a final announcement, stand-alone Xerox 6085 and 8010 workstations can now emulate TTY-type and DEC VT 100 terminals using VP Local TTY and Local VT 100. This module expands the terminal emulation capability to non-network Xerox workstation users.

Initial delivery of the Viewpoint software products will be in the second quarter 1986. The packages range in price from $100 to $495. For more information, contact Xerox, Xerox Square 006, Rochester, N.Y. 14644.

Circle Reader Service Number 222

COMPUTERWORLD FOCUS

Reader Service Cards

fill out these reply cards and circle the numbers that correspond to the numbers on advertisements and editorial items that are of interest to you.

Computerworld Focus **Reader Service Card** ③ **Issue: Feb. 19th/Expires Apr. 30, 1986**

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- 12 ☐ Computer/Peripheral Dealer/Distributor/Retailer
- 13 ☐ Other Vendor ______________ (please specify)

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- 3 ☐ MIS/DP Management
- 4 ☐ MIS/DP Operations
- 5 ☐ Data Communications Management
- 6 ☐ Data Communications Operations

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Plexus Computers Introduces Four Programming Tools To Expand Unix Software Development Line

SAN JOSE, Calif. — Plexus Computers, Inc. has announced the addition of four products to its line of programming tools. Designed to enhance Unix software development efforts, the products are Fast/Cobol, a high-level Cobol compiler; Fast/Basic, a Microsoft Corp. Basic-compatible compiler; Cdb, a C source code debugger; and Fortran 77, an advanced Fortran 77 compiler.

Fast/Cobol can be used by programmers to increase the compile speed on programs written in RM/Cobol and can reduce the execution time of these applications, thereby increasing throughput and giving more users access to the system.

Fast/Basic is designed to ease the transition for programmers from a DOS environment to Unix and has a command syntax identical to that of Microsoft's Basic, thus enabling users to write code for Unix applications without learning a new language.

Cdb is an interactive source-level debugger that allows programmers to locate and fix bugs in the context in which they were created, thus reducing development time, according to the vendor. In addition, Cdb is Unix System V-compatible.

The vendor offers developers working in Fortran the ANSI standard SVS Fortran 77 compiler and debugger. This package contains a number of language extensions that facilitate the conversion of programs written in Fortran 66 dialects.

The list price for full development and run-time versions of Fast/Cobol is $2,200 for all Plexus computers. Fast/Basic is available at a list price of $600 for all Plexus computers.

Cdb is available for $950 on the MC68010-based P/15 and P/20, supporting 8 and 8/16 users respectively. The package lists for $1,200 for the 16-user P/35 and the 40-user P/60. Fortran 77 is available for $800 on the P/15 and P/20 and $1,200 on the P/35 and P/60. Contact Plexus Computers, Inc., 3833 N. First St., San Jose, Calif. 95134.

Circle Reader Service Number 223

Integration of Fourth-Generation Language Pro-IV Is Announced

LAGUNA HILLS, Calif, — Pro Computer Sciences, Inc. recently announced that its fourth-generation language Pro-IV, integrated with Digital Equipment Corp.'s A-to-Z business system, allows A-to-Z's programs to share data and calls with applications developed using Pro-IV.

DEC's A-to-Z package features word processing, spreadsheets, business graphics, electronic mail, data base manager and text editor, that all share a common user interface. Pro-IV is available either as a package integrated with A-to-Z or as a partially integrated program.

In addition to Pro-IV's ability to integrate with A-to-Z, the recently enhanced Version 1.3 includes other features such as security, a language-like logic section and the ability to read and write sequential files.

The product is available for the entire DEC line of hardware. In addition, Pro-IV will run with existing data bases on a wide range of systems by different vendors, according to the vendor. Prices for the DEC line start at $800 for the run-time version on the PDP-11/24 and $5,500 for the development version on the PDP-11/24. For more information, contact Pro Computer Sciences, Inc., 23181 Verdugo Drive, Laguna Hills, Calif. 92653.

Circle Reader Service Number 224

3 Plus Unveiled

MOUNTAIN VIEW, Calif. — 3Com Corp. introduced its 3 Plus line of software products for local-area and wide-area personal computer networks.

3 Plus capabilities include interlinking of separate local networks (internetworking), dial-in access to network resources by remote personal computers, electronic mail within and across networks and communications with mainframes.

Three software standards — the Redirector and Netbios protocols and MS-DOS 3.1 operating system — provide compatibility with current and future multiuser programs developed for use with IBM's PC-DOS 3.1 operating system, PC Network and Token Ring Local-Area Network. 3 Plus networks also support existing single-user PC-DOS programs, said the vendor.

3 Plus Share is $550 per server in the five-user version, $1,100 for the unlimited-user version. 3 Plus Mail is $250 and $500 per server for the five-user and unlimited-user versions respectively. 3 Plus Menus is $150 and $300. 3 Plus Remote is $295 per remote workstation. 3 Plus Route is $1,250 per server. 3 Plus Path is $500 per server. Contact 3Com Corp., P.O. Box 7390, 1365 Shorebird Way, Mountain View, Calif. 94039.

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Commodore World, is a monthly publication with a circulation of 22,000. Editorial targets the Commodore user with reports on all aspects of Commodore operations.

PC World Espana is a monthly magazine for over 20,000 users of IBM PCs and compatible products.

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Micro Focus Adds Enhancements

PALO ALTO, Calif. — Micro Focus, Inc. has announced a new version of its VS Cobol Workbench. The new product, an integrated programming environment for micro-to-micro and micro-to-mainframe development, is faster than the previous version and has added features, the vendor said.

Version 1.2 has improved screen handling for micro-targeted applications, enhanced host testing facilities and more extensive syntax. Other enhancements include full DOS 2.0 path support and an upgrade to the Accept/Display screen-handling module to be compatible with the module in Professional Cobol.

Another product by Micro Focus is an enhanced version of micro/SPF. The micro/SPF system is a program development tool for the micro that sets up an operating environment that models the Interactive System Productivity Facility environment used on many mainframes. VS Cobol Workbench costs $4,000; micro/SPF costs $175. Contact Micro Focus, Inc., 2465 E. Bayshore Road, Palo Alto, Calif. 94303.

Circle Reader Service Number 226

SCO Adds Xenix System V for IBM Personal Computers And Compatibles

SANTA CRUZ, Calif. — The Santa Cruz Operation (SCO) recently announced the release of SCO Xenix System V for the IBM Personal Computer, Personal Computer XT, Personal Computer AT and compatible computers. According to the vendor, SCO Xenix System V was the first implementation of the Unix operating system to pass AT&T's System Verification Suite for conformance to the System V Interface Definition, AT&T's System V standard.

Available as a packaged product for both 8088/8086-based PC XT-compatibles and 80286-based PC AT compatibles, SCO Xenix System V will run binary programs developed on any previous SCO release for personal computers. In addition, said the vendor, applications developed on SCO Xenix System V are portable between the 8086 and 80286 versions of the product as well as any other vendor's Xenix System V release for the 80286.

SCO Xenix System V consists of the Xenix operating system, Xenix Software Development System and Xenix Text Processing System. The Xenix System V Software Development System includes the full set of development tools traditionally available with Unix systems plus a large model C compiler, macro assembler and MS-DOS cross development environment, according to the vendor.

The SCO Xenix System V Operating System lists for $495, the Software Development System for $495 and the Text Processing System for $295. The entire bundled system sells for $995. For more information, contact The Santa Cruz Operation, P.O. Box 1900, 500 Chestnut St., Santa Cruz, Calif. 95061.

Circle Reader Service Number 227

Forte Expands Product Line

SAN JOSE, Calif. — Forte Communications recently announced products that expand its product line in the areas of graphics, file transfer, electronic mail and extended terminal emulation capabilities.

Fortegraph APA and Fortegraph 3270 PC software give IBM Personal Computer, Personal Computer XT, Personal Computer AT and IBM PC-compatible computer users interactive access to IBM's advanced All-Points-Addressable host graphics. These products allow users to display with no modifications 3270 APA color graphics designed for IBM 3270 PC/G, 3270 PC/GX and 3179/G terminals, according to the vendor.

The two graphics products support IBM's GDDM 4.0 version of graphics software. APA graphics downloaded and stored from the mainframe can be converted into IBM PIF formats for later output or incorporation into other files.

Another announcement the company made is Fortenet II, a file transfer package that offers a programmable interface callable from mainframe applications to provide complete unattended file transfer between mainframe and PCs. In addition, the vendor said that Fortenet's file transfer speed has been increased by 50%. Fortenet II also has an optional set of program interface macros that let host-based applications automatically invoke file transfers to and from PCs. The vendor says that the product transfers complete mainframe files to a PC, PC XT, PC AT or PC-compatible computer over 3270 coaxial networks and converts them to a variety of PC-DOS formats.

Available immediately, Fortegraph APA is $795, Fortegraph 3270 PC is $795 and Fortenet II costs $1,000 for a one-time site license fee. Contact Forte Communications, 2205 Fortune Drive, San Jose, Calif. 95131.

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CALENDAR

February 19-21, Los Angeles — **Optimizing Software Productivity and Quality.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

February 24-29, Paris — **MICAD '86.** Contact: World Computer Graphic Association, Inc., Suite 399, 2033 M St., NW, Washington, D.C. 20036.

February 24-26, Dallas — **SNA.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

February 24-26, New York — **Decision Computing: Strategies, Technologies and Practice.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

March 3-4, Dallas — **Software Verification and Validation.** Also, March 6-7, San Jose, Calif., and March 24-25, Los Angeles. Contact: Education Foundation of the Data Processing Management Association Conferences, c/o Technology Training Corp., Dept. SVV, P.O. Box 3608, Torrance, Calif. 90510.

March 3-5, Dallas — **The Micro-Mainframe Connection.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

March 3-5, Los Angeles — **Controlling Software Projects: Management, Measurement and Estimation.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

March 6-7, Dallas — **Industry Update: Management Information Systems.** Contact: Infomart, 1950 Stemmons Freeway, Dallas, Texas 75207.

March 10-12, New York — **Strategies for Office Automation.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

March 10-12, New York — **The Integrated Voice/Data PBX: Architecture and Products.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

March 9-12, San Diego — **Fourth Annual Computer-Based Training Conference and Exposition.** Contact: Conference Registrar, Weingarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

March 9-12, Houston — **Automation '86.** Contact: Automation '86, P.O. Box 202350, Austin, Texas 78720.

March 11-13, Washington, D.C. — **Optical Storage of Documents and Images.** Contact: Technology Opportunity Conference, P.O. Box 14817, San Francisco, Calif. 94114.

March 12-19, Hannover, W. Germany — **Hannover Fair.** Contact: Hannover Fairs USA, Inc., P.O. Box 7066, 103 Carnegie Center, Princeton, N.J. 08540.

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